UNDP / GEF Danube Regional Project

Support for the Extension of Accident Risk Spots Inventory and Preventive Measures

Final Report

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Umwelt Bundes Amt für Mensch und Umwelt

ICSS

IABG

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UNDP/GEF Danube Regional Project

Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin

Final Report

Project Component 2.3-2 / 2.3-3: Support for the Extension of Accident Risk Spots Inventory and Preventive Measures

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Prepared by:

ICSS, Kathrin Werner

IABG, André Dahn

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K. Werner (ICSS) at the Federal Environmental Agency of Germany A. Dahn (IABG)

Preface

The project was conducted by the IABG and ICSS/Federal Environmental Agency of Germany on behalf of UNDP and in close cooperation with the APC Expert Group of the ICPDR. The project time frame was 10 months starting from January 2003. Within this time frame the project findings were discussed twice in the small APC working group for the OCS inventories (March and July) and presented afterwards in two expert group meetings hold at Vienna in April and Ljubljana in September this year. At the end the following products are delivered as a result of the project findings:

- Proposal for evaluation criteria to perform an actual risk assessment on ARS
- Tool for the preassessment of suspected contaminated sites, called m1- methodology
- Recommendation on safety requirements for contaminated sites in flood risk areas
- Draft of a checklist methodology for the investigation and risk assessment of contaminated sites in flood risk areas
- Project proposal on actual risk assessment of ARS
- Project proposal on know-how transfer for safety measures of contaminated sites in flood risk areas

The final report consists of two essential parts. The first one is dealing with the evaluation of the findings of the ARS inventory in the Danube River Basin and the conclusion for further investigation needs and the second will cover the whole proceeding for the inventory, investigation and assessment of suspected contaminated sites as far as the identification of safety measures to be performed.

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Abbreviations

APC EG	Accident Prevention and Control Expert-Group
ARS	Accidental risk spots
CS	Contaminated sites, sites which are contaminated by hazardous substance. This term substitutes the term OCS according to the agreement of the APC EG during the meeting in Ljubljana I September 2003.
ICPDR	International Commission for the protection of the Danube River
OCS	Old contaminated sites, the term was formerly used for contaminated sites
SCS	Suspected contaminated sites. Sites, which are under suspicion to be contaminated by hazardous substances
WRC3	Equivalent for the water risk class 3
WRI	Water risk index

1 Executive Summary

The project, which will be described in the following, is consisting of two major tasks aimed at an

- upgrade of the accidental risk spot (ARS) inventory, which was performed in 2001 by the experts of the ICPDR and
- an assessment and prioritisation of old contaminated sites (OCS) in flood risk areas

Both tasks and their findings are summarized separately in the following.

ARS Inventory

A basin wide inventory of potential accidental risk spots was carried out on behalf of the International Commission for the Protection of the Danube River (ICPDR) in 2001. For the classification of potential risk spots, a common procedure was elaborated considering actual European regulations and findings:

- The findings of the ICPE
- the EU „Seveso II" directive
- the „UN/ECE agreement on the effects of industrial accidents (Industrial accident convention)

Objective of this inventory was the identification and preliminary ranking of potential accidental risk spots based on estimated water risk equivalents (WRC 3-equivalents) and calculated water risk indices. After the upgrade of the ARS inventory ín 2003, where also the additional data from Austria was considered, about 650 risk spots were recorded and 620 were evaluated. As a result it could be identified a hazardous equivalent of about 6,6 Mio tons in the Danube catchment area. Emphasis was to point out the potential danger and not the actual danger.

In consequence to this purpose the inventory led to results, that countries with industries comprising large amounts of water hazardous substances were automatically prioritised risk spots regardless, if safety measures were performed or not.

It is not surprising, that the high percentage of the hazardous substance and consequently the risk was located in Germany and also Romania, where the amount of hazard equivalents is significantly determined by one mining industry. According to the results of this proceeding Germany and Romania should be given the highest priority in safety measures, if potential danger would approximate the actual danger. Thus the elaborated ranking of the risk spots could not give information to set priorities in actual needs for safety measure performance in these countries.

The findings of this investigation led to new proposals of evaluation criteria for the actual risk assessment of ARS and the risk potential of contaminated sites (CS). The criteria were the following:

- Present safety level in comparison to demanded safety level in installations
- Present information in comparison to demanded information level in industries and authorities
- State of the art in safety techniques and operational requirements in the country
- Present legal requirements in the country

These criteria should be verified in a pilot project, which was proposed to be performed in 2004 and 2005 on exemplary factories of the same industry sector in three countries with different present safety standards. The suggested industrial sector for this pilot project is refinery and oil processing. The APC EG supported this proposal in the APC EG Meeting at September 7th 2003 in Ljubljana.

Inventory of Contaminated Sites

In addition to the ARS inventory, the experts of the Danube countries performed in 2002 a compilation of abandoned sites supposed to be contaminated by former industrial activities or waste disposal.

Based on these data a methodology for the pre assessment was elaborated, which can be used as a screening tool for suspected contaminated sites with regard to their risk potential. Sites with a high risk potential should be investigated further in view to a more concrete risk estimation and ranking. Based on that estimation it is possible to elaborate a list of necessary immediate measures to enhance the safety level of the site.

In addition a recommendation on safety requirements for contaminated sites in flood-risk areas was prepared as a guideline. Also a draft of a questionnaire and checklist was elaborated, which should serve as a basis for the first risk assessment to be performed at site by the country experts. The checklist contains also a screening of properties, which are consisting of several suspected contaminated sites, with regard to the aspects substantial hazard, flooding potential, mobility of contaminated volume or of the contaminant itself and the information level about the site. The drafted checklist should be seen as a "living document", which should be optimised during their implementation in the site investigation in the next year. All the findings of the experts should be introduced to enhance the practicability and the conclusiveness of the checklist methodology. This activity should be combined with exemplary active safety measures at a pilot site, which will serve as a focal point for international know how transfer.

2 Background

Since the two accidents occurred at mining installations in Baia Mare and Baia Borsa in January and February 2000 an Inventory of Potential Accidental Risk Spots (ARS) in the Danube River Basin was carried out being one of the first international reviews of potentially dangerous installations in the Danube region.

In this ARS Inventory, which was completed in summer 2001, 611 potential accidental risk spots in 9 countries as the most significant potential hazards in the Danube catchment area were identified in industrial installations, where about 6 million tonnes of dangerous substances equivalent to the highest Water Risk Class (WRC) 3 are handled and stored.

The actual risks arising from those sites depend on the applied safety measures of each installation. In order to assess the real safety level that has been attained, special checklists have been developed, which should be used by the authorities of Danube states in a further investigation on necessary safety measures to be formulated for each potential accidental risk spot. So the ARS inventory is to be seen as an ongoing activity with regular updates.

Contaminated sites caused by industrial activities like in figure 1 pose a potential danger for the environment. Especially contaminated sites containing hazardous substances could lead to a significant contamination of water bodies, if the substances will be mobilised (e.g. by floods). During the last years the dramatic floods at Elbe, Danube and Oder have shown that the toxic impact of contaminated sites could cause a significant harm to water bodies in Europe. For that reason the ICPDR decided to draw up a basin wide inventory of contaminated sites in flood risk areas of the Danube river basin in addition to the ARS Inventory.

The APC EG developed brief criteria for selection of such sites. The national inventories of contaminated sites in potentially flooded areas were expected to be submitted until the end of 2002. Afterwards, the ad-hoc working group should develop further criteria for the prioritisation of contaminated sites. As the APC EG members did not have all the necessary expertise for the prioritisation of contaminated sites additional experts were invited to this ad-hoc working group.

In this context, part of the Project Output 2.3 (Improvement of procedures and tools for accident and emergency response with particular attention to transboundary emergency solutions will) focus on:

1. Support to completing and prioritisation of the inventory of contaminated sites in potentially flooded areas in the Danube River Basin (Activity 2.3-2)

2. Support to upgrade of the ARS Inventory providing the detailed analysis, distribution on sub-basin and industry branches and implementation of the check-lists (Activity 2.3-3)

Keeping these formulated activities in mind, the following main objectives will be derived:

- Assessment and prioritisation of contaminated sites in potentially flooded areas

- Upgrade of the ARS Inventory

Further information will follow in the next chapters.

3 Part A: Project Activity 2.3-3

The inventory was supplied by information of the ICPDR- Countries. For the classification of potential risk spots, a common procedure was elaborated considering actual European regulations and findings such as

- The findings of the International Commission for the Protection of the Elbe River (ICPE)
- The EU „Seveso II“directive
- The „UN/ECE agreement on the effects of industrial accidents (Industrial accident convention)

The Inventory of Potential Accidental Risk Spots (ARS) in the Danube River Basin is the first international review of potentially dangerous installations in the Danube region.

In the following the

- objectives of this inventory,
- the methodology of the ranking of risk spots,
- the results of the assessment and
- the findings and conclusions for the next steps in the investigations

will be described.

3.1 Objective of the ARS Inventory

Main objective of the ARS inventory is the identification and preliminary ranking of the hazard potential of existing industrial installations. The findings of the inventory should lead to a more concrete list of industries, which include substances hazardous to water bodies, and should deliver a more concrete description of the hazard potential situation in the Danube River Basin. Based on those results it should enable surveillance authorities to elaborate an agreed and suitable measure catalogue for the enhancement of the safety levels in the investigated region.

Emphasis was to point out the potential danger and not the actual danger of industrial installations

3.2 Description of the Methodology

The hazard potential of accidental risk spots is based on estimated water risk 3 equivalents (WRC 3-equivalents), based on the highest water risk class 3 (WRC3). The equivalent is defined as a product of the substance specific water risk class ranged between 0 until 3 and the mass of the hazard substance. On this basis a water risk index (WRI) is calculated by log WRC3 similar to Richter scale for the evaluation of the earth quake intensity, which makes it possible to rank industrial sites with regard to their water hazard potential. It is exemplary shown in Table 1

For the determination of the WRC3 and the calculation of WRI the mass and the water risk class of the hazardous substance is to be known.

The calculation of the WRC3 equivalents showed substances with low water risk class (WRC) have a negligible effect to the total WRI. They must be only considered in case of very large quantities.

Substance	Amount [kg]	WRC	WRC3-equivalent [kg]	W.R.I
Paraffine	10.000	"0"	10	1
NaOH	10.000	1	100	2
Ammonia	10.000	2	1.000	3
Acrylnitril	10.000	3	10.000	4

Table 1: Exemplary compilation of the water risk indices with regard to substances with different water risk classes

All industrial sites with a value under the cut off threshold WRI<=5 were not relevant for further risk assessment.

3.3 Results

Considering the added results of Austria, which were delivered 2003, about 652 ARS were recorded, and 621 could be evaluated according to the above described method. (See Table 2)

Country	Reported ARS	Evaluable ARS	Total quantity [kg]	Total W.R.I	Average of W.R.I. per enterprise
Austria	41	41	628.404.967	8,8	7,2
Bulgaria	29	28	370.000.000	8,6	7,1
Germany	56	56	2.300.000.000	9,4	7,6
Croatia	30	26	136.000.000	8,1	6,7
Moldova	27	14	3.600.000	6,6	5,4
Romania	67	59	2.100.000.000	9,3	7,6
Slowak. Rep.	148	145	251.000.000	8,4	6,2
Slovenia	2	2	980.000	6,0	5,7
Czech. Rep.	9	8	145.000.000	8,2	7,3
Hungary	243	242	707.000.000	8,8	6,5
Total	652	621	6.641.985	9,8	7,1

Table 2: Results of the ARS inventory

It could be stated that the Danube catchment area covers a WR3-equivalent of about 6.6 Mio t. Germany and Romania include the highest hazard potential. One third of this amount is located in Germany; even one fourth of the whole hazard potential is located only in Romanian mining activities. These countries comprise also the enterprises with the highest averaged W.R.I. related to the enterprise. Austria and Hungary show W.R.I.-values of about 8.8, but Austria is considering a less

number of industries with high amount of water risk equivalent and Hungary summarizes huge number industries, which comprise only less water risk equivalents.

3.4 Conclusions and Recommendations for Further Investigations on Actual Risk Assessment

According to the results of this proceeding Germany and Romania should be given the highest priority in safety measures, if potential danger would approximate the actual danger, but usually one can not equally compare potential with actual danger. So in the last Small APC Expert Group Meeting in Vienna, dated March 18th 2003, we agreed, that for the identification of the actual danger in a second step further investigation is needed. Those further investigations must also consider the following aspects:

- Safety standards of installations and management,
- measures to be taken and already performed, regarding stepwise implementation
- lack of information about the industrial activity in the relevant authorities
- Missing implementation of capacity building for sufficient expert opinion in relevant authorities

Based on that conclusion a first attempt was made to introduce a proposal for actual risk determination in step 2, which was shown as a first draft in a formula as follows:

$$\mathbf{WR_AI = Log\ [WRC3*(1-\ F_S)*(1-F_T)*(1-F_I)/S]}$$

WR_AI as an actual risk water index

WRC3 as calculated water risk equivalent

F_S as a degree of performing/fulfilling identified safety measures <1

F_T as a degree of safety training of personal <1

F_I as a degree of information level of industries and authorities <1

S = Stage of fulfilling the demands of safety measures

1 = short term; 2 = medium term; 3 = long term

F_S could be defined as the percentage of achieved/fulfilled safety measures with regard to the list of safety demands formulated by the relevant environmental surveillance authorities.

FT could be defined as the percentage of achieved/fulfilled safety training measures with regard to the listed trainings needs formulated by the relevant technical surveillance authorities.

FI could be defined as the percentage of achieved information level related to estimated maximum information level in the country. The approach shall be proved through exemplary pilot site investigations.

3.5 Further Steps

Further investigation is needed to identify the actual danger of ARS. Main objective of further steps should be the development of a basin wide harmonised methodology, which helps to identify the actual risk of ARS. Therefore know-how transfer and discussion between all experts of the Danubian countries are needed, which enable the definition of agreed criteria for the actual risk assessment. For the actual risk assessment the following aspects should be considered:

- Safety standards of installations and management, safety measures to be taken and already performed, regarding stepwise implementation

- lack of information in authorities about the industrial activity
- Harmonised proceeding for the assessment in every Danubian country
- Adaptation and verification of the checklists at industries with different developed safety levels

The findings of the investigations should lead to a branch related guide to be transferred to other enterprises as far as regional and national administrations.

These investigations have to meet the

- Need of harmonising the assessment, which is regarding also the enhancement of the safety level in each industry,
- need of further development of the checklist in consequence to the criteria, which will be developed/ determined for the evaluation of the actual risk,
- need of training and know how transfer for elaboration of measure catalogues and evaluation of achieved safety levels,
- need of verification of the amended checklists

These requirements could be met through a study, where three exemplary pilot industries of different development stages (related to the safety level) were chosen. The development of the evaluation criteria and the checklists should be supplemented through an on site verification performed by the experts in their own country, which helps on one hand to perform a stepwise implementation of capacity building and a creation of sufficient expert opinion in relevant authorities and on the other hand it gives a feedback about the country specific needs, which have to be taken into consideration for the development of an assessment methodology. For the preparation of the site investigation the following requirements must be met:

- Pilot industries of different development stages must be chosen, which include a quite similar hazard potential.
- The safety measures in these industries must be either already started already ongoing or nearly completed.
- The technical and organisational action plan of the investigated industries must cover safety measures in short, medium and long term.
- The findings should lead to a confirmation/adoption of the ARS Checklist methodology
- The transfer of the findings to other enterprises, regional and national administrations must be possible.

A suited project proposal was presented and confirmed in the last expert group meeting in Ljubljana. The proposal is attached to this report (Annex 10).

4 Part B: Completing and Prioritisation of the Inventory of Contaminated Sites in Potentially Flooded Areas in the Danube River Basin (Activity 2.3-2)

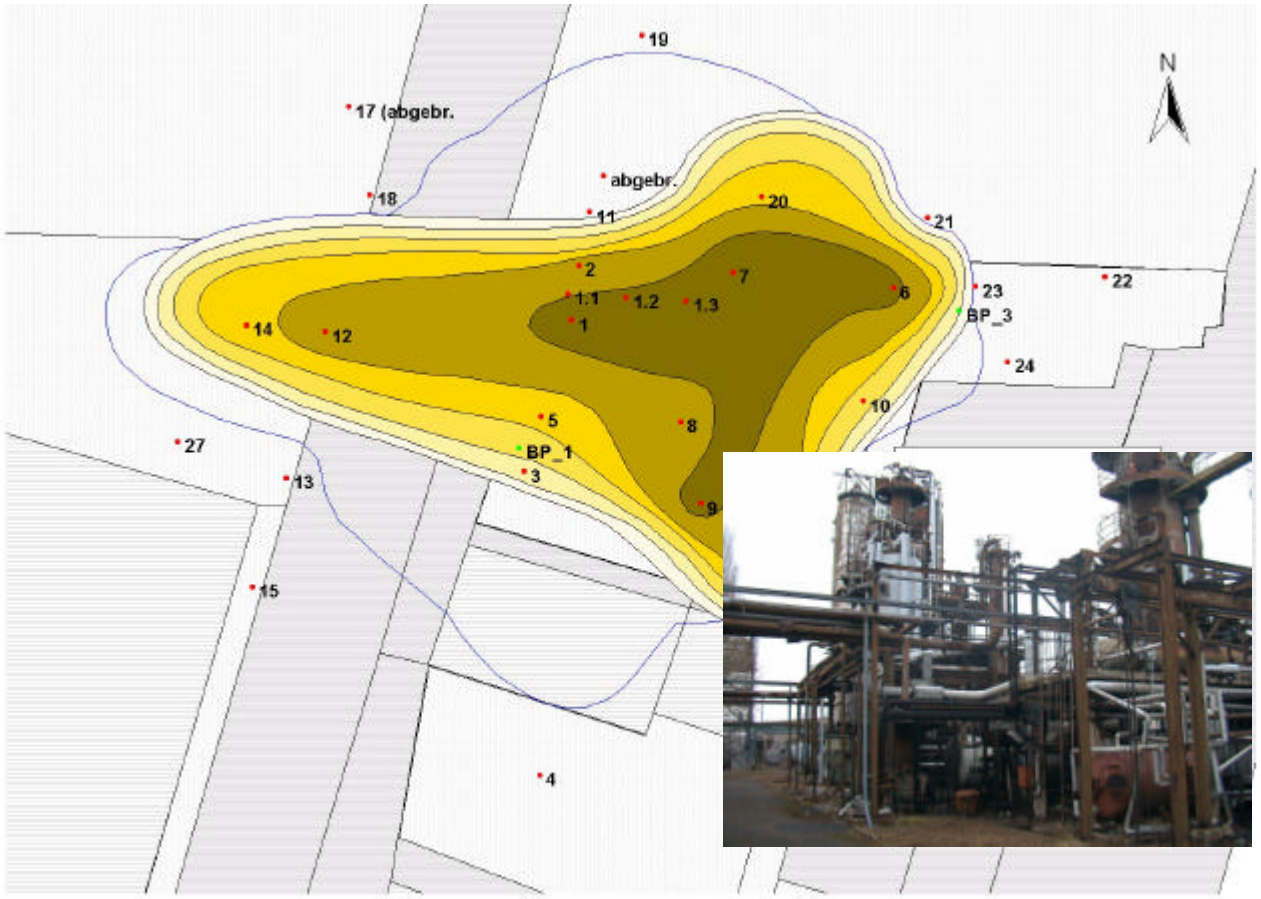


Figure 1: Oil contamination in an industrial area

4.1 Objectives and Milestones of the Work Program

The major goal of Part B of the project was to develop a draft guide line for the countries of the Danube River Basin, which enable the competent authorities of the riparian countries to maintain the following activities:

- Establishment of a methodology for the pre assessment for the compiled data of suspected contaminated sites in flood risk areas
- Drawing up recommendations for respective safety measures which could serve as regulatory guidelines.
- Drafting a Measure catalogue for the exemplary imple mentation of these safety guidelines.

This objective led to the following stepwise proceeding:

4.1.1 Inventory and Screening of Contaminated Sites

In a first step a method for the pre assessment of contaminated sites in flood risk areas compiled in the inventory of Danube countries with regard to their risk potential was developed and adopted, which should serve as a screening tool and as a decision support system to classify

- single suspected contaminated sites or
- properties consisting of several suspected contaminated sites

as relevant to be investigated further in view to their actual risk.

The resulted product of that task and the modified version which includes the amendments is shown in Annex 8.

4.1.2 Recommendation on Safety Requirements for Contaminated Sites and Checklist Methodology

In the second step a recommendation on

Safety Requirements for Contaminated Sites in Flood-risk Areas

was prepared, which should help to elaborate a detailed measure catalogue for an investigated site and which allows the competent authorities to improve the safety of contaminated sites and to reduce the risk of contamination of the Danube

Additionally a draft

Checklist for the investigation and assessment of contaminated sites in flood risk areas

was developed and applied in an exemplary site visit. The experiences gained lead to amendments of the checklist.

The final products are shown in annex 6 and annex 7.

4.1.3 Milestones of the Work Program:

Milestone	Time schedule
To analyse the Inventory of suspected contaminated sites in flood risk areas in the Danube River Basin and prepare discussion paper for the ad-hoc working group on the inventory ranking system (methodology including risk assessment of priority sites)	done, m1-methodology approved in the 27th APC meeting
Organize and visit of 2 exemplary contaminated sites (case study) to apply the check list methodologies at the national level. (Copsa Mica and Hunedoara, Romania)	in June
Recommendation on Safety Requirements for Contaminated Sites in Flood-risk Areas	Draft discussed in the Small expert group meeting in July
Checklist for the Investigation and Risk Assessment of Contaminated Sites in Flood Risk Areas	Draft of the checklists were discussed after site visit in Copsa Mica
Presentation and adoption of the recommendation and checklist drafts at the 28th APC meeting	Done in September, 8-9th 2003
Final adaptation of the recommendation and safety guidelines	Until the midst of September
Final adaptation of the checklists	In November
Final report	End of November

4.2 Inventory of Contaminated Sites

4.2.1 Proceeding of the Data Record

According to the recommendation of the ICPDR meeting in June 2002 a specific inventory of abandoned contaminated sites was compiled, in particular with regard to sites where potentially contaminants may be released in the case of flood incidents. The existing Federal Inventory of Contaminated Sites of Austria (FCSI) which is compiled and managed by the Federal Environment Agency of Austria served as the basis for the closer definition of contaminated sites in flood risk areas.

Sites which meet one of the following criteria were excluded from the inventory:

- Waste sites with a disposal volume smaller than 100,000 m³.
- Industrial sites with surface areas smaller than 5.000 m².
- Small enterprises where only small amounts of hazardous substances were dealt with.
- Sites where remediation measures had already been implemented and which can hence be considered to have a low contamination potential.
- Contaminated sites situated at large distances to surface waters, where no impacts can be expected even in the case of a disastrous flooding incident.

Until the end of February 2003, the first inventory of contaminated sites performed by the Danubian Countries should be evaluated. In the midst of March the Danubian countries reported 212 contaminated sites in potentially flooded areas of the Danube. Sites from Croatia, Bulgaria and

Germany were delivered in May. Finally Bosnia also reported contaminated sites. The data vary in quality and reflect the different stage of management of contaminated sites in the different countries. The data in detail are shown in Annex 1.

4.2.2 Identified Problems and Solutions

After the review of the data, the following problems were identified, when the inventory was compiled considering the a.m. exclusion criteria:

- Nearly every Danubian Country, which has performed the investigation, listed also sites which met the a.m. exclusion criteria, because the exclusion criteria did not fit with the countries´ own priority listing of the CS. So the number of suspected contaminated sites became higher as expected.
- In many cases it was difficult to differ between industrial sites and waste deposits. Only the tables of Austria and Hungary showed a distinction between industrial sites and waste deposits. All other countries focussed at landfills or deposits.
- It was not quite clear for every country, if abandoned industries or waste deposits are situated in flood risk areas and if they are really endangered by flood events.
- A comparison between the countries according to the waste codes was not possible. Only Romania specified additionally the waste code of the disposed substances.
- The data about handled or disposed substances in the industrial area or in the deposit sites could not exactly be quantified for every country. Only Moldova was able to give exact data for every listed site. In general, size, type and location of the contaminated area or contaminated volume was only estimated. So a determination of the risk potential according to the ARS inventory is not feasible without a wide limit of variations. For the assessment of risk potentials in CS a new method had to be elaborated.
- The criteria lead to a complete exclusion of CS in Slovenia. (Please find the excerpt of the statement from Slovenia Annex 1.5)
- Also Bosnia could not identify sites according to these criteria

Considering the listed problems the exclusion criteria were slightly modified during the APC Small Expert Group Meeting in March. The criteria are listed beneath:

- old industrial sites with an area smaller than 5.000 m^2
- old deposits with a contaminated volume smaller than 100.000 m^3
- sites outside of flood risk areas

The criteria aimed at focussing on those sites, which represent the tip of the iceberg and dominate mainly the risk potential in the Danube river basin. The Danubian Countries were requested to adapt their lists according to the modified criteria and to apply for the preliminary risk assessment of CS. They were also asked to list more abandoned industrial sites with potential hazards and to focus on sites endangered by floods.

In sum it could be stated, that for the completion of the inventory additional data had to be delivered by the Danubian States. Finally it was agreed, that for the risk assessment a new methodology must developed, which allows a rough prioritisation of the sites potentially hazardous to water based on the existing data.

For the ranked sites suitable tools for the

- risk assessment and
- formulation of safety measures (in form of recommendation and check lists)

should be developed and proved later in exemplary visits of pilot sites.

A first draft of a checklist was elaborated and implemented at the Small Expert Group Meeting in July in Sibiu at a first site visit. Furthermore a recommendation on safety requirements for contaminated sites in flood risk areas was developed.

A tool for the preliminary risk assessment of the suspected contaminated sites (see Figure 2) was presented in the first expert group meeting in April 2003 in Vienna, which was based on expert knowledge about the industrial sector classification and waste classification following the experience of the Federal State of Saxony in Germany. This methodology was adopted to be used for the first pre assessment. The proceeding of the so called m1-methodology is described in annex 8. The results of the first pre assessment are shown in the next chapter.

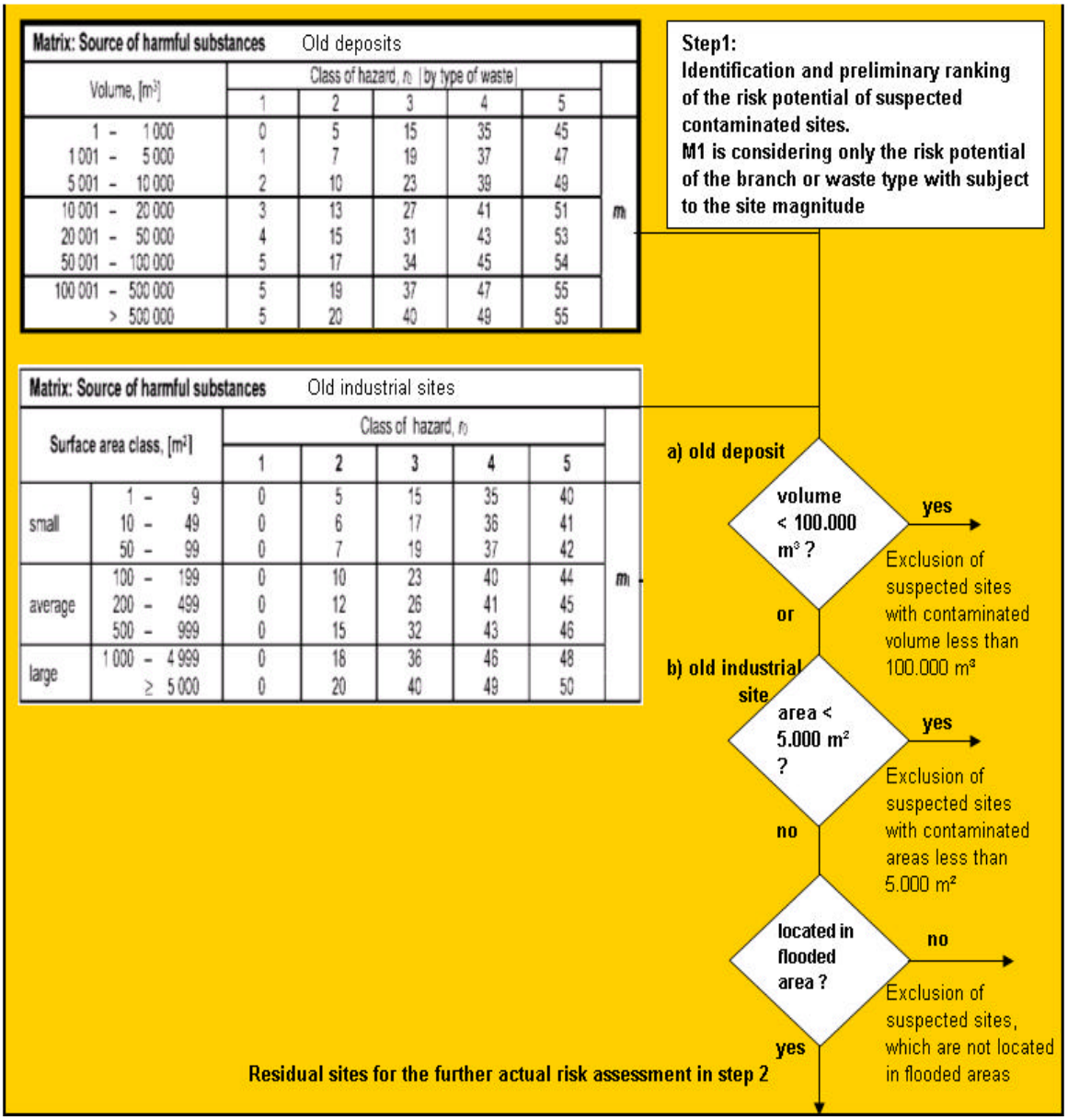


Figure 2: Illustration of the first step of the risk assessment

4.2.3 Results of the Pre Assessment of Suspected Contaminated Sites according to the m1-Methodology

The results are based on the inventory of the Danubian Countries as of end of May. The tables of the national inventories are shown in annex 2. The table was added and completed as follows:

- Austria sent data inclusive m1-value
- Croatia delivered data according to the format of the Hungarian data
- Czech Republic added the list with contaminated sites on industrial sites
- Germany delivered data according the criteria defined in the last Small Expert Group Meeting.
- Hungary delivered data modified according the criteria defined in the last Small Expert Group Meeting.
- Moldova and Bulgaria focussed on environmental risks caused by pesticides coming up from landfill use or storage. Bulgaria even took measures for pesticides disposal, so these sites will be no more critical in future. For Moldova the situation seems to be the same, if further unsafe disposal of pesticides is stopped.
- Slovakia focussed on waste deposits
- Ukraine delivered mainly data about deposits and tank facilities, but the sites were excluded according to the defined criteria. The only exception is the Odessa area Izmail Cellulose-cardboard combine.
- Bosnia completed the data end of 2003 for ARS but could not deliver data according to the defined criteria.. According to available data there were no heavy contaminated sites on the presented area, which could cause significant contamination of the water due to flood impact.

Sites	**Number**
Registered	261
Evaluable	157
Classified by volume or area:	108
Classified by mass*	38
Classified by area	11
After applying the exclusion criteria: sites with volume >100,000 m³	67**
Sites with area >5,000m³	11

*The mass (tons) was converted into volume (m³)

** Splitting in countries find in table 4

Table 3: Listed sites with a high risk value

At large 261 sites were reported. The data were very heterogeneous and were focussed on (industrial) waste deposits. Former industrial sites were only reported by Austria. The inventories of each country, assessed by m1-methodology, as described above, result in 157 valuable sites of total 261 sites, which represents a degree of 60 %. One third of the valuable sites had shown no waste code, so the sites were classified according to the European waste Catalogue as far as possible. The resulting table is shown in Annex 3.

Country	Number of sites with a contaminated voume of higher than 100.000 m³	Percentage
Austria	5	7,46
Germany	2	2,99
Hungary	29	43,28
Romania	12	17,91
Slovakia	17	25,37
Ukraine	2	2,99
Total	67	100,00

Table 4: Listed sites with a contaminated volume higher than 100.000 m³

After applying the agreed exclusion criteria 78 sites (67 waste deposits see table 4 and figure 3, 11 abandoned industrial sites) were left.

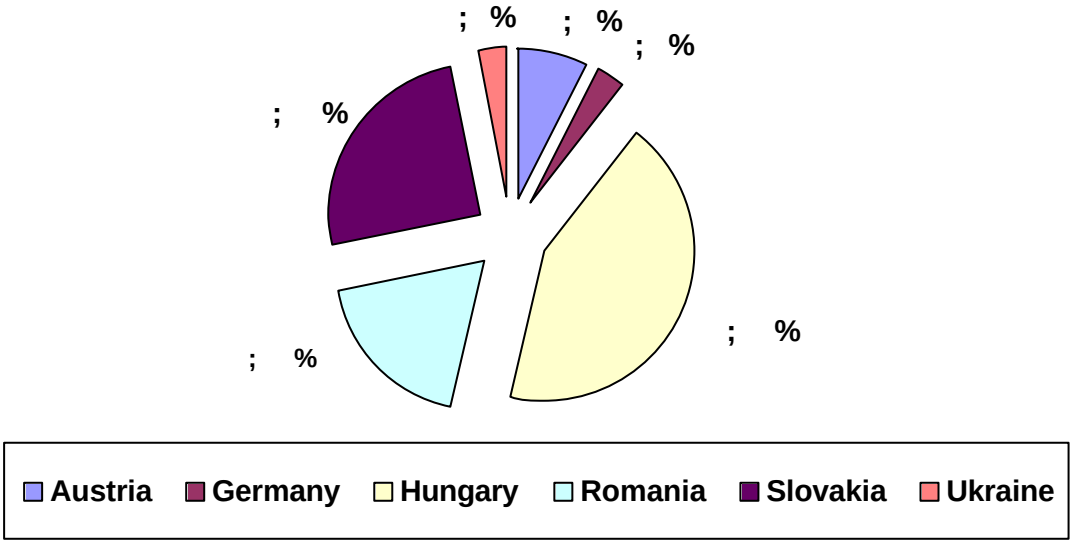


Figure 3: Listed sites with a contaminated volume higher than 100.000 m³

Applying a hazard value threshold of 47 for waste deposits and 50 for abandoned industrial sites following result was obtained:

- 38 waste deposits (Splitting in Countries find in table 5 and figure 4)
- 11 abandoned industrial sites (listed by the Austrian experts)

Country	Number of sites with a risk value > 47 according to the new assessment proceeding	Percentage
Austria	3	7,89
Germany	2	5,26
Hungary	9	23,68
Romania	8	21,05
Slovakia	14	36,84
Ukraine	2	5,26
Total	38	100,00

Table 5: Listed sites with a high risk value m1 >= 47

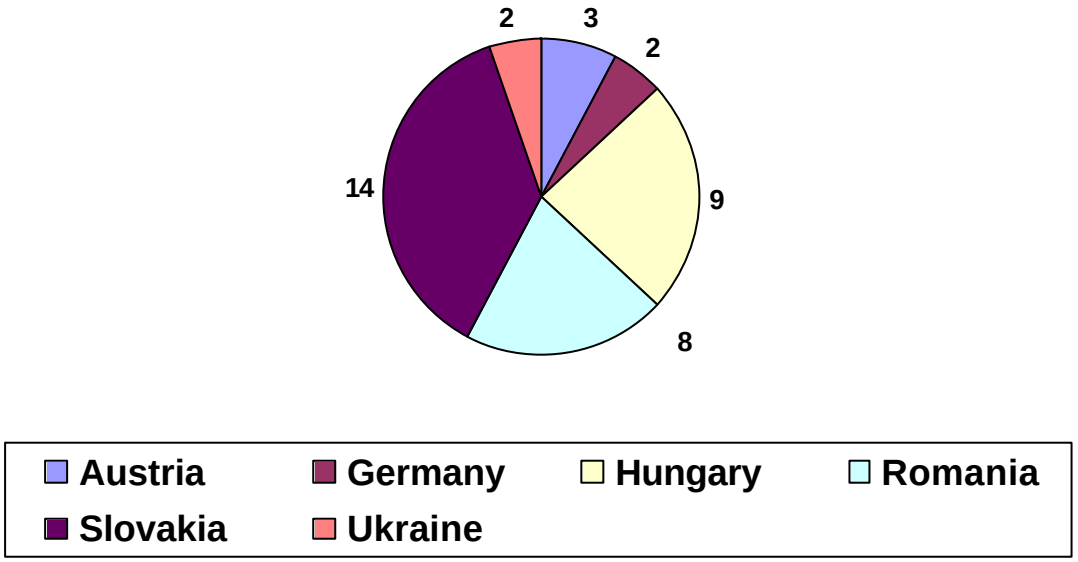


Figure 4: Listed sites with a high risk value m1 >= 47

7 sites (3 sites in Romania and 2 sites in Slovakia and 1 site each in Hungary and in the Czech Republic) reached the m1 values higher or equal 47, but with contaminated volumes lower than 100.000 m³. We recommend that those sites should also be considered for further risk assessment and if necessary, for the elaboration of a list about short, medium and long term safety measures.

It was also a very astounding result, that the number of contaminated sites between Bavaria (Germany) and Austria were very different, although similar numbers of sites were expected. We presume that the defined exclusion criteria of a flood risk area were construed differently. It seems also possible that each country expert was evaluating either the whole property or only the contaminated part (site) of a property. Considering the last case most of the sites have to be excluded, because they are under the exclusion value of 100.000 m³ contaminated volume or 5.000 m² contaminated area.

4.2.4 Recommendations for the m1-Methodology

Within the APC expert group meeting in Vienna the m1-methodology and the results after the implementation of the methodology were presented. The methodology was adopted by the expert group taking into consideration the following suggestions for improvement:

First step to improve the methodology: Extended m1-Methodology

The differentiation between sites of an extension larger than 5.000 m² or of volume bigger than 100.000 m³ is hardly to reach. Maximum values of about 50 or 55 will be not useful, so there has to be an extended range of values to allow a better differentiation in the ranking . The result of the extended range of values is also shown in annex 8. This evaluation step should serve as a first stage to rank properties. In future the methodology should be improved in a second step to a so called m2-Methodology.

In a second step further criteria should be integrated in the assessment like the probability of floods or the potential discharge of contaminants or contaminated volume in case of flooding. This evaluation step should serve as a second extended stage of the properties ranking. Also the definition, how a flood risk is defined should be concretised. So the different interpretation of the flooding situation could be avoided. These data should be delivered in a next step. The delivery of those data must be harmonised and agreed.

4.2.5 Conclusion for the further use of Pre Assessment Tools

The results showed, that the "m_1-methodology" as shown in Figure 2 could be one of the tools to be used in the pre assessment. So the results of this preliminary assessment do not demand a detailed description of the risk potential. A differentiated assessment, which gives more detailed information about the risk situation needs a detailed investigation using further criteria to determine the actual risk of sites in case of flooding.

It must be stated, that the "m1-methodology" is only the first step of the assessment. Data had to be compared, which vary greatly among the different countries and the assessment is carried out on the basis of a small number of easily obtainable data: taking into account the hazard to be expected from a given waste or industrial branch and the size of the site. The extended m1-methodology is only to be seen as an operational tool for a rough ranking of whole properties according to their initial risk.

Any further risk assessment of the properties, which gives information about the actual risk in case of flooding, has to consider additional criteria like flood- proneness and potential discharge of contaminants (an old deposit above ground secured by unsafe dams is likely to be more endangered by flooding than deposits filled in a "hole"). These criteria for the actual risk assessment should be developed further and should be verified in a separate study in the next years. Nevertheless the criteria should be presented later in the checklists as a so called m2-methodology, which is seen as an additional attempt to enhance the ranking accuracy. A first approach is shown in the checklist (See Annex 7).

Before the verification of these special criteria will be started, a basic revision of the checklist had to be done with regard to the practicability of the checklists in the frame work of the site visits and the suitability of the questionnaire according to the country specific requirements. So it became necessary, to verify the elaborated checklist for the investigation of contaminated sites in abandoned properties through exemplary visits on real sites. On the basis of the findings the first draft of the checklists should then be discussed and the recommendation on safety requirements could be finally revised. These targets should be met at the meeting of the Small APC working group in Sibiu.

The following work steps were performed for this meeting:

- Preparation of the recommendation draft for the final discussion in the APC small expert group
- Preparation of the first draft of the checklists for the discussion and amendment.
- Preparation of suitable site visits nearby Sibiu
- Presentation of the drafts in Sibiu to the APC small expert group and to official representatives of the regional water management agency in Sibiu.
- Performance of the site visits
- Discussion of the findings and conclusion for the prepared documents (Definition of additional criteria for the actual risk assessment of CS)

The performance and the results of this meeting are presented in the next chapter.

4.3 2nd Meeting of the Small APC Working Group on Inventories

After the completion of the ranking list the final draft of the recommendations of safety measures were elaborated. The draft was presented at the 2nd meeting of the Small APC Working group in July 17th and 18th of July at Sibiu and served as basis for the later discussion with the APC experts. Additional to the recommendations a second draft of the check list for the further risk assessment of contaminated sites was prepared. With regard to their practicability and the suitability of the chosen evaluation criteria these drafts should be proved through visits of exemplary high risk sites. Copsa Mica and Hunedoara in Romania served as location for the site visits. The sites visited are shown in photo documentation in annex 9. An excerpt of the visit is compiled in the following.

4.3.1 Visit of Contaminated Sites in Copsa Mica

In Copsa Mica, there is an area of around 55 ha, which was or still is used for industrial production. The industrial area is located 60 km in the north from Sibiu and about 15 km in the southwest of Medias in the midst of the Transylvanian region (see also the map in Figure 5).

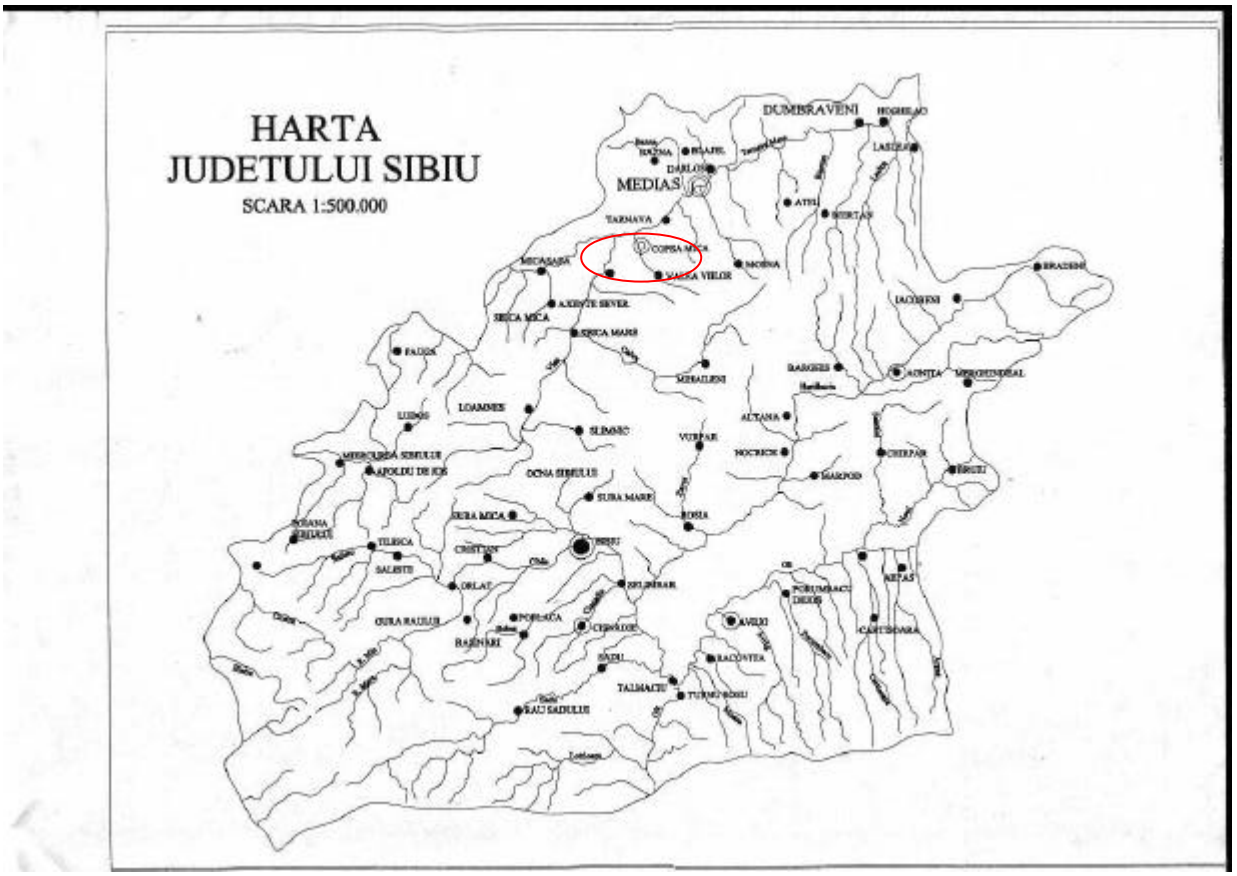


Figure 5: Map of the Sibiu Region

The area is divided into two zones:

1. The still operating factory Sometra
2. The closed-down factory Carbosim

Sometra

In Sometra lead, zinc and copper are still produced. The production is based on a thermal destruction of the raw materials, usually sulphide ores of the metals above mentioned. The product is precipitated as dust in the electro filter system, the first stage of the waste gas treatment. The parts, which were not precipitated, are removed also over waste gas washing system. The sludge of metal hydroxides was recovered as sediment in the waste water treatment, so it is due to a washing system as second step in a waste gas treatment. The sludge is recycled into the thermal treatment. The slag arising from the combustion is disposed at the industrial site. Due to the treatment temperature in the incineration stage the slag could be not eluted, so heavy metal residues in the slag could be not washed out.

In former years the precipitation process was not operating, when electro filter systems produced by the Soviet Union were operating. Therefore the complete area and also the slag dumps are contaminated with heavy metals, which led later to a significant hazardous impact to groundwater. In the photo documentation the slag dumps and the factory are illustrated. Figure 6 shows, that the dump is directly located at the river side. In this case there is a direct potential hazard for the river side, if the area is flooded or the dumps are directly impacted by heavy rain events. To avoid those incidents measures are necessary to be determined within an exemplary site study.

The contamination in this area is also confirmed by chemical analysis.

Figure 6: Slag dump at Sometra

Carbosim

The closed-down industrial facilities in the area of the former state enterprise Carbosim are illustrated the Figure 7. In former years graphite for initial fuses was produced by catalytic reduction of methane. The waste gases were not sufficiently treated, so the area was impacted by amounts of dust. Additionally Plexiglas and other goods were produced since the sixties (see Figure 8).

As a result of the industrial activities in this area, there is a strong suspect for soil contaminations caused by PAH and Cyanides. But in fact there are no results of analyses available, which confirm the contamination.

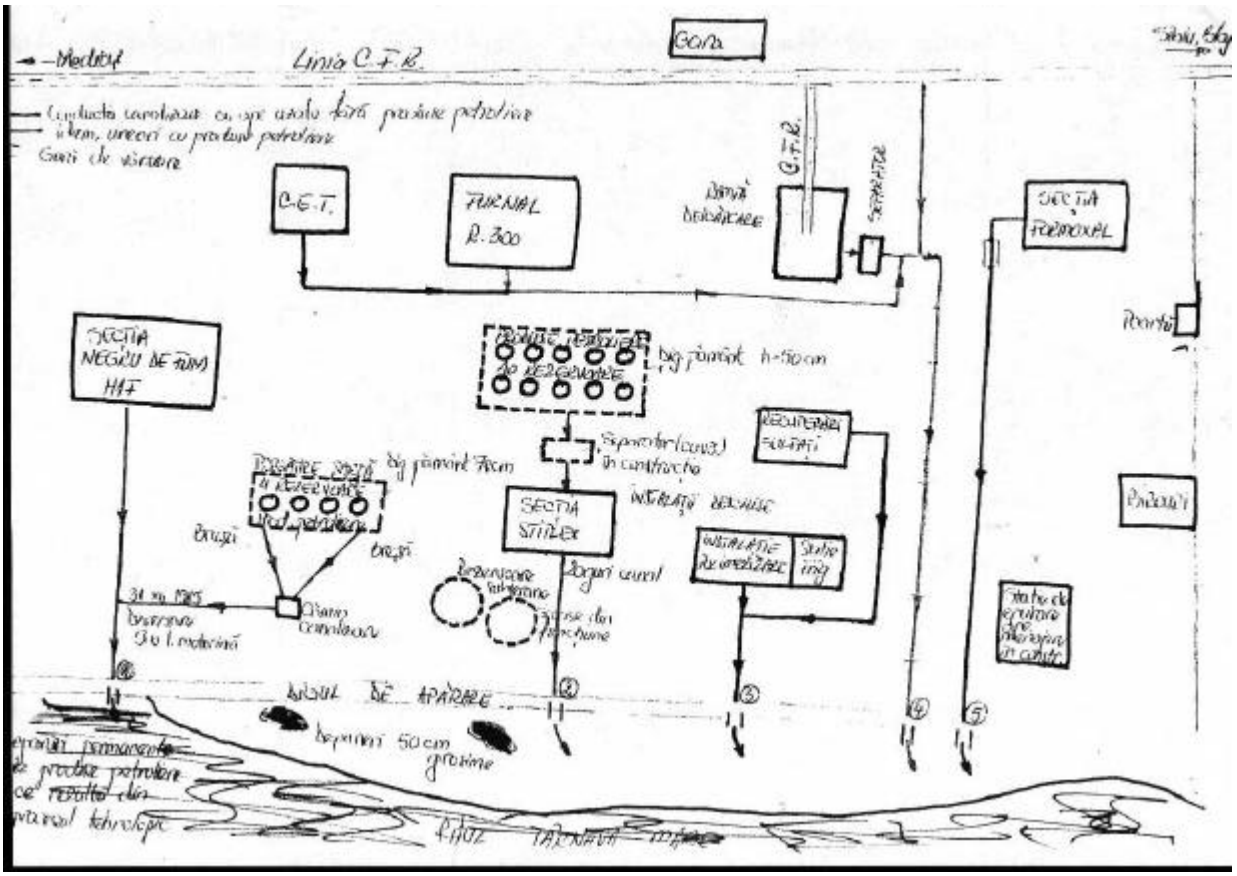


Figure 7: Hand sketch of the industrial area

Figure 8: Abandoned industrial plant at Carbosim

A further investigation should prove, if there is a risk of surface water being contaminated in case of a flood event. In particular the river dam must be investigated, because the site visit showed that the dam is not stable in case of heavy rainfall events. First measures to enhance the dam stability have to

be performed. Further investigations have to be maintained immediately to prove the actual risk of some contaminated sites identified during the visits (please find information in the photo documentation in Annex 9).

4.3.2 Visit of a Contaminated Site in Hunedoara

The visit in Hunedoara was directed to the State Company Siderurgica S.A., a huge metal combination without metal processing facilities. The company focussed at steel production (semi-finished products).

As much as the incineration plant is operating in Sometra the steel production line in Hunedoara operates also at temperatures of above 1500 – 1700°C, which leads to not elutable slag. So the main wastes disposed at site are not critical.

An environmental problem was suspected in the acid storage facilities and especially in the tar distillation process, where asphaltenes were separated from naphthalene's. The last mentioned products are very hazardous to water. In case of further investigations, the area nearby the tar production and the feeding pipelines of this facility should be analysed with regard to PAH.

4.3.3 Safety Recommendation and Measure Catalogue

The presented draft recommendation was revised by the small working group. The amendment proposals from Richard Stadler and Martha Wepner, which could not assist to the meeting, were taken into account.

The small working group agreed to insert a recommendation with precautionary character: it shall be recommended, that in future, new deposits and industrial sites where substances are handled which are hazardous to water, shall not be constructed in flood risk areas.

4.3.4 Checklist for the investigation and risk assessment of contaminated sites in flood risk areas

After the presentation of the checklists, their application was shown by an exemplary template for the site in Copsa Mica. As a result of the discussion it can be stated, that the checklist is useful for the site visits and should be presented for adoption in the next APC Meeting. For a better understanding of the checklist the following amendments were formulated:

- The objectives of the further investigations should be described
- It is necessary to add some answering possibilities for some questions (for example "not known" or "not applicable")
- It was agreed, that the checklist should be structured as follows:
  - One part for the pre-assessment of the risk potential and completion of the data base (does not involve a site visit),
  - Further investigation of abandoned sites (industrial sites, waste management sites installations (for the site investigation),
  - Assessment and list of measures (findings and conclusions are formulated based on the gained data)
  - Additional data framework to be used in following investigations.
- The elaboration of measures should be more concretised and supported by a decision tree.
- The identified hot spots in contaminated sites should be ranked in a second step according to the WRI determination in the ARS inventory.

The checklist has to be considered as a "living document", that means it will be adapted in the next 2-3 years, according to the experience gained by its application at site visits by inspectorates and other experts.

4.3.5 Conclusions and Further Proceeding

It was agreed, that recommendation and checklists were suitable for the further use in site investigation. As a result of the first implementation of the checklist, it can be stated, that there is a need for amendment to facilitate the use of the templates (for example to outsource gathered data, which are not used in the first instance). Additional data should be recorded, if the processor needs them for further investigations. The templates should be divided in parts, which can be either filled in at site or in the office. All tools should be prepared for the presentation at the APC Expert Group Meeting in Ljubljana in September the 7th and 8th, which is described in the following. The following proceeding was agreed within the meeting.

Checklists:

The checklists were discussed taking into account the experience of applying them at the sites in Copsa Mica and Hunedoara. They will be revised and send to all members of the small working group on inventories.

Safety Recommendation:

The revised 2nd draft of the recommendation will be sent to all members of the working group. Both, checklist and recommendation will be given to a native speaker for revising, when their final version is decided by the APC-Working Group.

Decision Proposals:

It was agreed to prepare decision proposals concerning

1. further projects on evaluation criteria for the ARS inventory and
2. further investigations on contaminated sites.

5 Final Presentation of the Products at the APC Expert Group Meeting

The products of this project were finally presented in the APC Expert Group Meeting hold in 7th and 8th of September 2003 in Ljubljana. The presentation was structured as follows:

- Photo documentation from the meeting of the Small Working Group OCS Inventory in Sibiu (including field visits) (see Annex 9)
- Ranking list of suspected contaminated sites in flood risk areas based on the assessment results made by the m1-methodology (see Annex 3).
- Recommendation on safety requirements for contaminated sites in flood risk areas
- Checklist for the investigation and risk assessment of contaminated sites in flood risk areas
- Project proposal about Know-how Transfer for safety measures of contaminated sites in flood risk areas
- Results of the update of the ARS inventory
- Pilot Project on Actual Risk Assessment of ARS

After the presentation all draft documents were discussed and commented thoroughly. All in all it could be stated the following:

5.1 Ranking List of Contaminated Sites

The ranking list of suspected contaminated sites was prepared based on results of national inventories (status as of end of May 2003) using M1 methodology and the agreed exclusion criteria. Around 180 sites were evaluated and altogether nearly 60 high-risk sites passed through this process. No data were obtained from Serbia and Montenegro, Bulgarian data focussed on chemicals, amounts were missing.

The primal results of discussion are the following:

- Because of missing data like the amount of contaminated volume or a missing classification of the risk value the evaluation and interpretation of the data was difficult. So in some cases the risk values were estimated. It has to be considered that the estimated data have a high inaccuracy which could lead to a wrong evaluation of the sites. So. the ranking list is not very much consistent, but it is sufficient for a first rough risk estimation and a screening of the sites. It can serve as a basis for Danube countries to make their national assessment.
- With the demand for an open score for the site categories, maximum values of 55 and 50 like in the first approach of the m1-methodology could not be used any longer. The range of the tables should be extended.
- A significant source of discrepancy was the flood proneness criterion, which was not applied by all countries in the first assessment step (please find result of the Austrian data in Annex 2.1).
- It was agreed, that for the first assessment step the use of the m1 methodology is sufficient, but the criterion of flood probability should be considered in the further development of the m1-methodology. The flood potential should be addressed in 2004 (as M2 methodology).
- The m1-methodology was adopted as a suitable guide for safety measures and should be presented within the 6th ordinary Meeting of the ICPDR in Vienna.

5.2 Recommendation on Safety Requirements for Contaminated Sites in Flood Risk Areas

The discussion of the recommendation led to the following results:

- In the discussion, the APC EG agreed to present the statement given in Paragraph 5.2 ("the countries should take care by appropriate legal provisions and measures that in future no new contaminated sites in flood risk areas will be created") separately as a general requirement and to propose it as a resolution for the next ICPDR meeting. The necessary backing-up legal provisions will be developed next year.
- It was recognised that the safety requirements address not only the old abandoned sites but, in principle, all sites suspected of being contaminated. Any discrimination between such sites would be peculiar. Therefore, it was agreed that in future the "OCS" would be referred to as "contaminated sites (in flood risk areas)"
- The recommendation was adopted as a suitable guide for safety measures and should be presented within the 6th ordinary Meeting of the ICPDR in Vienna.
- It was agreed, that the recommendation should be revised by a native speaker. (please find the revised version of the recommendation in Annex 6)

5.3 Checklists for the Investigation and Assessment of Contaminated Sites

In the discussion the following needs of amendment were pointed out by the expert group:

- Within the risk assessment the hazardous potential of the hot spots should be evaluated using the same approach as applied for ARS (WRC/WRI).
- Before its adoption by the ICPDR the checklist should be reviewed by competent national experts in waste management.
- The checklist should be primarily looked upon as a basis for development of risk assessment tools.

Finally, it was agreed that the revised checklist (please find the checklist in Annex 7) should be distributed to the APC EG members, who will forward it to national experts in waste management for commenting. Comments should be delivered until 28 February 2004. A final version should be prepared afterwards until 15 March 2004. The final version should include also an Excel version.[1]

5.4 Proposal for a Pilot Project for Further Investigations and Safety Measures at Contaminated Sites

A proposal for a pilot project of know-how and technology transfer for further investigations and safety measures at contaminated sites in flood risk areas was presented and discussed. The pilot project is focussed on training of national experts (future national trainers) at an exemplary site – it is a preparatory activity to get all experts to an equal knowledge level. The APC EG agreed with the project and proposed it for the UNDP/GEF DRP Phase II. The proposal is shown in Annex 11.

5.5 Pilot Project on Actual Risk Assessment of ARS

Based on the presented findings of the ARS review a proposal for a pilot project was presented, in which three industrial sites at different stages of implementation of safety measures should be visited and the measures checked. The suggested industrial sector for this pilot project is refinery/oil processing. A discussion on suitability of this sector for training purposes was held. GW pointed out that refineries are fit for purpose and that training will be focussed on special facilities. The APC EG supported the pilot project for ARS. The pilot project, described in more detail in Annex 10, should be performed in 2004.

1 In connection with the implementation of the WRI in the risk assessment of contaminated sites, it must be stated, that the estimated value of WRI can give only a more detailed information about the risk of the substance expected in the investigated site, which is sufficient for the first site assessment and ranking in a flood risk area. It does not consider the risk of mixtures of substances, possible degradation processes nor the flooding and mobility potentials of the substances in the contaminated zone in case of flooding. Furthermore the amount of the contaminant/contaminated soil may not be known.

6 Further Steps

Based on the agreement in the APC EG meeting in Ljubljana the following milestones were suggested for the next months:

Inventory of contaminated sites:

• Preparation of the revised material	End of October 2003
• Revision of the recommendation	End of October 2003
• Forwarding the revised draft of the checklist to national experts in waste management	End of November 2003
• Delivery of the national comments to the draft checklist	End of February 2004
• Preparation of a final version of checklists including an Excel version	Mid of march 2004
• Development of a training program to use the checklists	End of March 2004
• Presentation of the program	Beginning of April
• Definition of further criteria for the development of a M2-methodology	April 2004
• Preparation of a draft of a M2-methodology (only the rough frame work without detailed analysis of the criteria)	May 2004
• Renewal of the ranking list (draft)	May 2004
• Presentation of the results	End of may 2004
• Providing exemplary training for the national experts to use the revised checklists	Mid of June 2004
• Listing of the findings of the training measure and conclusion for the preparation of the national inventories	End of July 2004
• Start of the national inventories on CS	End of August 2004

Inventory of ARS:

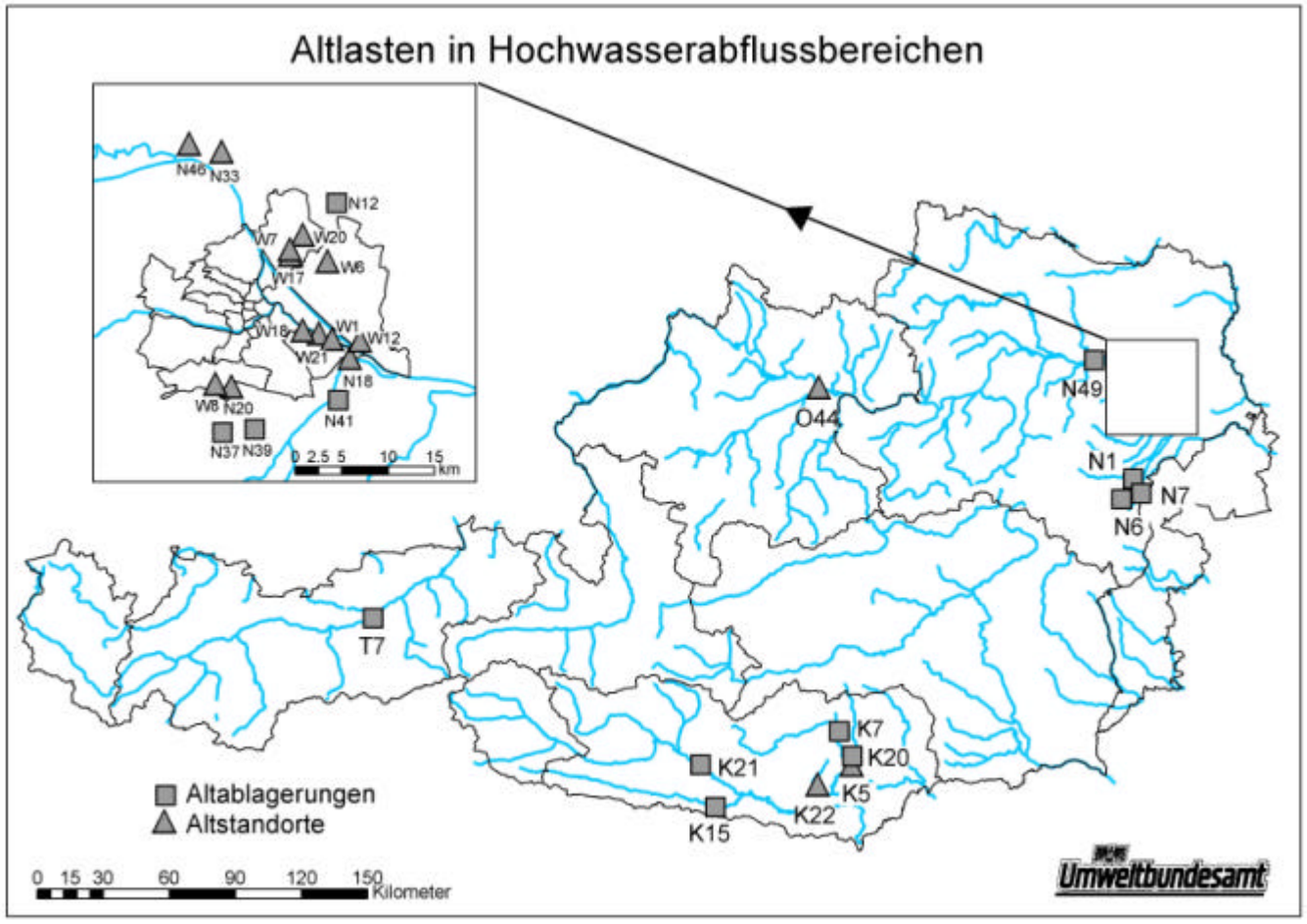
• Definition of criteria for the assessment of the actual risk of ARS	March 2004
• Preparation of exemplary site visits	End of March 2004
• Presentation, discussion and amendment of the program	Beginning of April
• Checklist application industries, oil processing sector	within the time frame of May and September 2004
• Listing of the findings and recommendation for further proceeding	End of September 2004

Annex 1

National Inventory of February 2003

Annex 1

A 1.1 OCS in Austria



Result of the existing Federal Inventory of Contaminated Sites (FCSI) Austria

This inventory was compiled and managed by the Federal Environment Agency of Austria served as the basis for the closer definition of contaminated sites in flooding areas. By 1 July 2002 the FCSI included 164 sites. From these total number those sites were excluded which meet one of the defined exclusion criteria from the expert meeting in 2002.

As the result of this exclusion process 29 sites involving a significant high potential of contaminants were retained for the inventory of contaminated sites in flooding areas. However, it has to be taken into account that at some of these sites remediation measures have already been started and the contamination potential will hence decrease significantly in the future. Regular updating of the inventory for contaminated sites in flooding areas should therefore be introduced compulsorily.

Bundesland	Nummer	Bezeichnung	Bezirk	Gemeinde	Art der Altlast	Art der Ablagerungen	Schadstoffe	Fläche	Volumen	Branche	Ablagerungs-/Betriebszeitraum
Kärnten	K22	Lederfabrik Neuner	Klagenfurt	Klagenfurt	Altstandort		Chrom	120000		Lederverarbeitung	seit 1922
Kärnten	K7	Deponie Roßwiese	Sankt Veit an der Glan	Althofen	Altablagerung	Industriemüll	Metalle, Mineralisierung		500000		1950-1992
Kärnten	K20	Kalkdeponie Brückl I/II	Sankt Veit an der Glan	Brückl	Altablagerung	Industrieabfälle, Bauschutt, Aushubmaterial	CKW (Tetrachlorethen, Trichlorethen, Hexachlorbutadien)		250000		1926-1981
Kärnten	K5	Donau Chemie Brückl	Sankt Veit an der Glan	Brückl	Altstandort		CKW, Trichlorethen, Tetrachlorethen, Hexachlorbutadien	50000		Chemische Grundstoffindustrie	seit 1909
Kärnten	K21	Betriebsdeponie Heraklithwerke Ferndorf	Villach Land	Ferndorf	Altablagerung	Industrieabfälle	Magnesium, Sulfat		500000		seit 1961
Kärnten	K15	BBU Blei- und Zinkhütte Arnoldstein	Villach Land	Arnoldstein, Hohenthurn	Altstandort		Metalle	300000		Chemische Grundstoffindustrie, Metallerzeugung	seit 1882
Niederösterreich	N33	Werft Korneuburg	Korneuburg	Korneuburg	Altstandort		Metalle, Mineralöl	200000		Schiffbau	1845-1994
Niederösterreich	N46	Tanklager Mare	Korneuburg	Korneuburg	Altstandort		Mineralöl	10000		Mineralöllager	1930-1990
Niederösterreich	N39	Sportplatz Wiener Neudorf	Mödling	Wiener Neudorf	Altablagerung	Aushubmaterial, Bauschutt, Hausmüll	Deponiegas, erhöhte Mineralisation, reduzierende Verhältnisse		430000		1963-1970
Niederösterreich	N37	Deponie Wiener Neudorf	Mödling	Wiener Neudorf	Altablagerung	Aushubmaterial, Bauschutt, Hausmüll	erhöhte Mineralisation, reduzierende Verhältnisse		870000		1963-1970

Bundesland	Nummer	Bezeichnung	Bezirk	Gemeinde	Art der Altlast	Art der Ablagerungen	Schadstoffe	Fläche	Volumen	Branche	Ablagerungs-/Betriebszeitraum
Niederösterreich	N20	Raffinerie Vösendorf	Mödling	Vösendorf	Altstandort		Mineralöl, PAK	145000		Mineralöl-Raffinerie	1920-1960
Niederösterreich	N49	Deponie Tulln	Tulln	Tulln	Altablagerung	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	reduzierende Verhältnisse, erhöhte Mineralisierung		200000		1972-1984
Niederösterreich	N12	Kapellerfeld	Wien Umgebung	Gerasdorf	Altablagerung	Hausmüll	erhöhte Mineralisierung, CKW		2000000		1966-1985
Niederösterreich	N41	Deponie MA 48 - Zwölfaxing	Wien Umgebung	Zwölfaxing	Altablagerung	Aushubmaterial, Bauschutt, Hausmüll	Deponiegas, erhöhte Mineralisation, reduzierende Verhältnisse		450000		1977-1980
Niederösterreich	N18	ÖMV-Raffinerie Schwechat	Wien Umgebung	Schwechat	Altstandort		Mineralöl	1500000		Mineralöl-Raffinerie	seit 1930
Niederösterreich	N6	Aluminiumschlackendeponie	Wiener Neustadt	Wiener Neustadt	Altablagerung	Bauschutt, Hausmüll, Industrie-/Gewerbemüll	erhöhte Mineralisierung, reduzierende Verhältnisse, Aluminium		360000		seit 1974
Niederösterreich	N1	Fischer-Deponie	Wiener Neustadt Land	Theresienfeld	Altablagerung	Hausmüll, Industrie-/Gewerbemüll	CKW		800000		1972-1987
Niederösterreich	N7	Mülldeponie S.A.D.	Wiener Neustadt Land	Lichtenwörth	Altablagerung	Industrie-/Gewerbemüll, gefährliche Abfälle	CKW		700000		1973-1989
Oberösterreich	N44	Chemiepark Linz	Linz	Linz	Altstandort		CKW, BTX	850000		Chemische Grundstoffindustrie	seit 1942
Tirol	T7	Rotteballendeponie Pill	Schwaz	Pill, Weer	Altablagerung	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	erhöhte Mineralisierung, reduzierende Verhältnisse		1000000		1973-1990
Wien	W1	EBS-BP-TKV	11. Simmering	Wien	Altstandort		Mineralöl, CKW	200000		Mineralöllagerung, Tierkörperverwertung	
Wien	W18	Gaswerk Simmering	11. Simmering	Wien	Altstandort		PAK, Cyanid, Mineralöl, Phenole,Ammonium, Sulfat	325000		Gaswerk	1900-1975
Wien	W21	Teerag-Asdag-Simmering	11. Simmering	Wien	Altstandort		PAK, Phenole, BTX	130000		Teerverarbeitung	seit 1914
Wien	W7	SHELL - Pilzgasse	21. Floridsdorf	Wien	Altstandort		Mineralöl	100000		Raffinerie, Mineralöllager	1864-1970

Bundesland	Nummer	Bezeichnung	Bezirk	Gemeinde	Art der Altlast	Art der Ablagerungen	Schadstoffe	Fläche	Volumen	Branche	Ablagerungs-/Betriebszeitraum
Wien	W20	Gaswerk Leopoldau	21. Floridsdorf	Wien	Altstandort		PAK, Cyanid, Kohlenwasserstoffe	440000		Gaswerk	1911
Wien	W17	VCF-Perstorp	21. Floridsdorf	Wien	Altstandort		Phenol, reduzierende Verhältnisse	45000		Chemische Industrie	1894-1991
Wien	W12	Tanklager Lobau	22. Donaustadt	Wien	Altstandort		Mineralöl, Kohlenwasserstoffe	1000000		Tanklager für Mineralölprodukte	seit 1934
Wien	W6	Mobil	22. Donaustadt	Wien	Altstandort		Mineralölprodukte	120000		Mineralöl-Raffinerie	seit 19. Jhd
Wien	W8	Siebenhirten	23. Liesing	Wien	Altstandort		Cyanid, Kohlenwasserstoffe, Phenol, Ammonium, Nitrit, Sulfat	150000		Chemische Grundstoffindustrie	seit ca. 1828

Table 1.1-1: Results of the FCSI according to the defined criteria from 2002

A 1.2 OCS in Czech Republic

Table 1.2-1:

List of the water endangering old depositions in the Czech part of Morava river basin

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
Oil substances in the Velamos factory area	Loucna nad Desnou	Desna river (river km 26)	High	amount of several tons of oil substances affected by flood Q100
Sludge lagoons in the waste water treatment plant	Sumperk	Desna river (river km 6)	High	6 000 m3 of sludge with heavy metals affected by flood Q100
Toluene in the Farmak factory area	Olomouc	Morava river (river km 233)	Low (core wall)	amount of several tons of toluene affected by flood Q100
Oil substances in the Magneton factory area	Kromeríž	Morava river (river km 195)	Lowv(partial remedial works)	amount of several tons of oil substances affected by flood Q100
Oil substances in the Precheza factory area	Prerov	Becva river (river km 12)	Lowv(partial remedial works)	amount of several hundreds kg of oil substances affected by flood Q100
Oil substances, polycyclic aromatic hydrocarbons in the DEZA factory area	Valasske Mezirici	Becva river (river km 60)	Low (hydraulic blanket)	amount of several tons affected by flood Q100

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
Aliphatic chlorohydrocarbons in the MEP factory area	Postrelmov	Morava river (river km 300)	Low (partial remedial works)	amount of several tens kg affected by flood Q100
Old industrial dump	Slapanice	Ricka river (river km 12)	Low	amouint of 10 m3 of tar affected by flood Q100
Old plant for chlorohydrocarbon regeneration	Letovice	Svitava river (river km 62)	Low	amount of 1 ton of chlorohydrocarbons affected by flood Q100
Chlorohydrocarbons in the Magneton factory area	Valasske Klobouky	Brumovka river (river km 9)	Low	amount of 500 kg of chlorohydrocarbons affected by flood Q100
Chlorohydrocarbons in the Mars factory area	Svratka	Svratka (river km 160)	Low	amount of 200 kg of chlorohydrocarbons affected by flood Q100
Old deposit	Pozdatky	local stream and Jihlava river (river km 90)	Low	unknown amount of sulphuric acid affected by flood Q100
Chlorohydrocarbons and heavy metals in the Zbrojovka factory area	Brno	Svitava river (river km 6)	Low	unknown amount affected by flood Q100
phosphates from fertilizer production in the Fosfa factory area	Postorna	Dyje river (river km 25)	Low	unknown amo unt affected by flood Q100

A 1.3 OCS in Hungary

Old deposition type:

- . Contamination from old accidents
- . Agricultural landfill
- . Industrial deposit
- . Old mining tailiing
- . Old military site
- . Communal organic dump wastestorage

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. UPPER DANUBE ENVIRONMENTAL INSPECTORATES AREA						
	. Old mining tailiing						
1	*1.* I-II Reservoir for red-dross	Almásfüzito 119/11 Hrsz	X=590 327 Y=265 665	Danube 1749-1761 (rkm)	Unknown	red-dross 450 000 m^3	yes
2	*2.* III. Reservoir for red-dross	Almásfüzito 118	X=590 300 Y=265 600		Unknown	1 000 000 m^3	yes
3	*3.* IV. Reservoir for red-dross	Almásfüzito 06/12			Unknown	600 000 m^3	yes
4	*4.* V. Reservoir for red-dross	Almásfüzito 06/10			Unknown	800 000 m^3	yes
5	*5.* VI. Reservoir for red-dross	Almásfüzito 06/8			Unknown	1 800 000 m^3	yes
6	*6.* VII. Reservoir for red-dross	Almásfüzito 03/29,30,31	X=592 500 Y=265 000		Unknown	3 250 000 m^3	yes
7	*7.* VIII. Reservoir for red-dross	Neszmély 0125	X=600 871 Y=264 058		Unknown	5 000 000 m^3	yes
	2. MIDDLE DANUBE ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
8	*1.* Hole for acid resin	Százhalombatta MOL Inc.		Danube	Low	acid resin 8.000 t	no

Old deposition site					Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING			LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
9	*2.*	Hole for acid resin	Csepel MOL Inc.		Danube	Low	acid resin 55.000 t	no
10	*3.*	Gas cleaning mass	Budapest, YYII. Park u.- Gádor u.	X=646 700 Y=229 400 X=648 400 Y=231 400	Danube	Low	high sulphur content (15-20 %) cyaniduos iron-oxide 36 000 t	no
11	*4.*	Gas cleaning mass	Üröm - Csókavár	X=647 800 Y=249 500			high sulphur content (15-20 %) cyaniduos iron-oxide 62 000 t	no
12	*5.*	Area of former Csepel's Auto-Works	Szigetszentmiklós		Danube	Unknown	possible toxic heavy metal and hydrocarbon (CH) polluted (reveal is under way)	no
13	*6.*	Area of former Csepel's- Works	Budapest, XXI.		Danube	Low	possible toxic heavy metal and hydrocarbon (CH) polluted	no
14	*7.*	Abandoned sewage sludge depots	Budapest, Csepel-island Nord		Danube	Low	heavy metal and hydrocarbon (CH) polluted organic compounds 300.000 m^3	no
15	*8.*	Late Koporc estate	Balassagyarmat	X=668 800 Y=303 100	Ipoly	Low	perchlorone-ethylene (OKKP's proposal)	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. Old military site						
16	*9.* Former Soviet military querterage	Szentendre		Danube	Low	hydrocarbon (CH) polluted earthand earthwater (reveala is under way)	no
17	*10.* Former military Airport	Tököl		Danube	Low	hydrocarbon (CH) polluted earth: 308.000 m^3 hydrocarbon (CH) polluted earthwater: 209.900 m^3	no
18	*11.* Former Soviet military Airport	Kiskunlacháza		Danube	Low	hydrocarbon (CH) aviation kerosene pollution 9.000 m^3	no
19	*12.* Old military and MOL fuel depot	Ócsa		Danube	Low	hydrocarbon (CH) pollution	no
	. Old mining tailiing						
20	*13.* Fixon Bt. – Humiron Ltd Plant slag and dust-ash	Lorinci	X=697 50 Y=282 500	Zagyva	Low	slag and dust-ash 5 000 000 m^3	no
21	*14.* SAC Inc. – Slag-hill	Salgótarján	X=707 500 Y=308 400	Tarján-Brook	Low	slag and dust-ash	no
22	*15.* Metallochemia – metallurgical slag	Budapest, XXII. Harangozó u.	X=644 200 Y=227 800	Danube	Low	metalslag (Pb, Zn, Cu, Cd) 650.000 t	no
	. LOWER DANUBE ENVIRONMENTAL INSPECTORATES AREA						
	. Contamination from old accidents						
23	*1.* Contamination from old accidents	Baja Danube-riverside	X=641 600 Y= 93 500	Danube (1479,4)	Low	hydrocarbon (CH) contanimation 35 m^3	yes

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. Industrial deposit						
24	*2.* Industrial deposit	Lajosmizse	X=687 900 Y=186 100	XX/d-1 (6); (8); XX (27) DVCS (130) Danube (1480)	Unknown	mix galvanic sludge	no
	. Agricultural landfill						
25	*3.* Agricultural landfill	Soltvadkert	X=677 500 Y=135 800	VII/f (5) ; VII/ (19) DVCS (64) Danube (1480)	Unknown	cyanide blue-dregs 120 m^3	no
	. CENTRAL TRANSDANUBIAN ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
26	*1.* MAL Inc. I-VIII. store, reclaimed	Ajka	X=534 000 Y=194 000	Torna (52) Marcal (97,8) Rába (204,6)	Low	red-dross settlement 29 000 000 t	no
27	*2.* Bakonyi Eromu Inc.	Ajka		Torna	Unknown	gray sludge 15 000 000 t	no
28	*3.* Dunaferr Inc.	Dunaújváros	X=642 735 Y=174 625	Danube	High	industry sewage sludge storage 1 500 000 t	yes
29	*4.* Dunapack Inc.	Dunaújváros	X=642 735 Y=174 625	Danube (1573)	High	mix sludge 212 000 t	yes
	. SOUTH TRANSDANUBIAN ENVIRONMENTAL INSPECTORATES AREA						
	. Agricultural landfill						
30	*1.* Bóly Inc.-hog-farm	Sátorhely –törökdomb	X=620 710 Y= 66 470	Bédai holtág Danube (1435)	High	ammonium (NH_4^+) 22,2 t	yes
31	*2.* Bóly Inc.- dairy-farm	Sátorhely	X=617 990 Y= 65 850	Bédai holtág Danube (1435)	Low	ammonium (NH_4^+) 2,5 t	no

Old deposition site					Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING			LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
32	*3.*	Duna-gyöngye 2000 Mg. Inc.	Dunaszekcso	X=626 100 Y= 85 910	Danube (1460)	Low	ammonium (NH_4^+) 20 t	no
33	*4.*	ALM Ltd	Alsógyörgyös	X=524 700 Y= 77 900	Drava (165)	Low	ammonium (NH_4^+) 12 t	no
34	*5.*	Drava Coop Mg. Inc.	Komlósd	X=520 800 Y= 78 100	Drava (170)	Low	ammonium (NH_4^+) 3 t	no
35	*6.*	Drava Coop Mg. Inc.	Barcs	X=574 400 Y= 69 500	Drava (153)	Low	ammonium (NH_4^+) 7,5 t	no
36	*7.*	Hungaro-Seghers Hybrid Ltd	Mohács, Petofi major	X=621 355 Y= 69 762	Kölkedi focanal Danube (1440)	Low	ammonium (NH_4^+) 10,5 t	no
		. Communal organic dump						
37	*8.*	Settlement waste	Csurgó	X=501 000 Y=101 130	Drava (198)	Low	communal organic dump 36 000 m^3	no
38	*9.*	Settlement waste	Barcs	X=529 650 Y= 70 890	Drava (153)	Low	communal organic dump 300 000 m^3	no
39	*10.*	Settlement waste	Sellye	X=554 420 Y= 59 440	Drava (105)	Low	communal organic dump 74 000 m^3	no
40	*11.*	Settlement waste	Siklós	X=590 640 Y= 53 770	Drava (65)	Low	communal organic dump 112 000 m^3	no
41	*12.*	Settlement waste	Harkány	X=585 860 Y= 56 330	Drava (72)	Low	communal organic dump 114 000 m^3	no
42	*13.*	Settlement waste	Mohács	X=622 150 Y= 74 880	Danube (1445)	Low	communal organic dump 370 000 m^3	no
43	*14.*	Settlement waste	Dunaszekcso	X=627 010 Y= 85 180	Danube (1460)	Low	communal organic dump 20 000 m^3	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. NORTH HUNGARIAN ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
44	*1.* Tisa Chemical Self-contained plant	Tiszaújváros	x=798 042 Y=287 515	Tisa (484)	Low	industry sewage –earth dam 211.000 m^3	yes
	3. Old military site						
45	*2.* MH – Tarnaszentmária Fuel depot	Tarnaszentmária	x=736 250 Y=281 850	Tarna (49) Zagyva (58) Tisa (335)	Low	hydrocarbon (CH) polluted earth: 69.000 m^3 hydrocarbon (CH) polluted earthwater: 69.000 m^3	no
46	*3.* MH – Mezokövesd Fuel depot „K" area	Mezokövesd Hrsz: 0456/2	x=762 425 Y=272 900	Kánya Brook (14) Rima Brook (8) Tisa (434)	Low	hydrocarbon (CH) polluted earth: 52.500 m^3 hydrocarbon (CH) polluted earthwater: 67.500 m^3	no
47	*4.* MH – Setting Center Fuel depot	Recsk Hrsz. 0214.055	X=731 975 Y=286 950	Báj Brook (0,5) Parádi Tarna (7) Zagyva (58) Tisa (335)	Low	hydrocarbon (CH) free phase 280 m^3 hydrocarbon (CH) polluted earth: 15.700 m^3 hydrocarbon (CH) polluted earthwater: 4.710 m^3	no
48	*5.* Mezokövesd – „B" area Old Fuel depot	Mezokövesd Airport	x=768 200 Y=274 000	Hór Brook (2) Kánya Brook (14) Rima Brook (8) Tisa (434)	Low	hydrocarbon (CH) polluted earth: 300.000 m^3 hydrocarbon (CH) polluted earthwater: 60.000 m^3	no
49	*6.* Mezokövesd - West area Airport runway	Mezokövesd Airport	x=767 900 Y=274 000	Hór Brook (2) Kánya Brook (14) Rima Brook (8) Tisa (434)	Low	hydrocarbon (CH) polluted earth: 60.000 m^3 hydrocarbon (CH) polluted earthwater: 10.000 m^3	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. Old mining tailiing						
50	7. AES borsodi Energetikai Ltd Tiszapalkonyai Hoeromu	Tiszaújváros	X=800 150 Y=286 711	Tisa (483)	Low	sludgewater 800.000 t slag-dust-ash 1.400.000 t	yes
	. OVER THE TISA ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
51	1. Industrial deposit	Balmazújváros-Lászlóháza	X=815 500 Y=262 000	Magdolna ér (2), Kadarcs-Karácsonyfoki cs. (8), Hortobágy (41), Hortobágy-Berettyó (67), Körös (61), Tisa (243)	Unknown	1000 t	no
52	2. Industrial deposit	Debrecen-Szikgát	X=841 823 Y=242 981	Tócó (11), Kösely (61), Hortobágy (67), Körös (61), Tisa (243)	Unknown	40000 t	no
53	3. Industrial deposit	Tiszavasvári	X=824 284 Y=290 432	Hortobágy (91), Hortobágy-Berettyó (67), Körös (61), Tisa (243)	Unknown	3000 t	Low
	. Old military site						
54	4. Old military site	Berettyóújfalu	X=833 289 Y=213 923	Berettyó (43), Fast-Körös (14), Körös (90), Tisa (243)	Unknown	diesel oil	no
55	5. Old military site	Földes	X=828 200 Y=217 600	Sárréti canal (48), Hortobágy-Berettyó (43), Körös (61), Tisa (243)	Unknown	diesel oil	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. Agricultural landfill						
56	6. Agricultural landfill	Hosszúpályi-Fáy	X=856 089 Y=236 651	Pályi ér (4), Nagy ér (20), Kálló Focanal (29), Berettyó (23), Fast-Körös (14), Körös (90), Tisa (243)	Unknown	3000 t	no
	. MIDDLE TISA ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
57	1. ELEKTROLUX - LEHEL Ltd WDS-1 (wasteof chemical industry	Jászberény	X=711 216 Y=237 746	Zagyva (67) Tisa (336)	Low	polluted earth 155.000 m^3	no
58	2. TVM Inc. (waste of chemical industry	Szolnok	X=732 950 Y=199 716	Tisa (332)	Low	polluted earth 600.000 t	yes
59	3. Tisza Cipo Inc. estate (pollution and dangerous waste collecting	Martfu	X=744 500 Y=186 800	Tisa (305)	High	chrom polluted earth 23 t and unknown volume earthwater	yes
60	4. Mechanikai Muvek Inc. (chemical pollution)	Abony	X=723 630 Y=204 550	Dohányos-ér (3) Perje-focanal (5) Gerje-Perje (8) Tisa (328)	High	hydrocarbone polluted earth 1300 m^3	yes
61	5. BERVA Inc. (chemical pollution)	Heves	X=744 160 Y=251 350	Forrós-belwatercanal (8) Hanyi-ér (16) Tisa (388)	High	hydrocarbon polluted earth 10.500 m^3 earthwater 5000 m^3	no
62	6. REWOS Ltd (chemical pollution)	Törökszentmiklós	X=754 528 Y=203 598	Villogó (15) Tisa (343)	High	earthwater-pollution chlorinated hydrocarbans	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
63	*7.* TEGÉP Ltd (chemical pollution)	Tiszafüred	X=777 000 Y=254 000	Tisa (426)	High	no estimate hydrocarbon pollution earth and earthwater	yes
64	*8.* ELEKTROLUX – LEHEL manufactory (chemical pollution)	Jászberény	X=711 759 Y=239 395	Zagyva (67) Tisa (336)	High	no estimate earthwater pollution	no
65	*9.* Béghin-Say Cukorgyár Inc. (technology waste-water thickerer)	Szolnok	X=734 750 Y=200 250	Tisa (330)	High	waste-water thickerer in lake 1.300.000 m^3	yes
66	*10.* Szászakku-Coop Ltd (dangerous waste collecting)	Szászberek	X=729 000 Y=220 000	Zagyva (27) Tisa (335)	Low	acid accumulator waste 55 t	yes
67	*11.* TERSZOL Szövetkezet (galvanic sludge siccative and dangerous waste collecting)	Szolnok	X=733 000 Y=201 000	Görbe-ér (1) Tisa (331)	Low	mix galvanic sludge and else dangerous waste 4000 t	yes
	. Old military site						
68	*12.* Old Soviet Military Airport (chemical pollution)	Kunmadaras	X=781 755 Y=232 001	Üllo-Laposi (7) Német-éri (13) Hortobágy-Berettyó (82) Hármas-Körös (61) Tisa (243)	High	hydrocarbon polluted earth 14.500 m^3	no
	. Agricultural landfill						
69	*13.* ATEV animal debris waste deposit (dangerous waste deposit)	Tószeg	X=730 327 Y=196 049	Gerje-Perje (5) Tisa (328)	High	animal debris waste 10.596 t	yes

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. LOWER TISA ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
70	1. Fémszelekt	Algyo		Tisa	Unknown	Ni, NH_4, NO_3, Mo, Cu, Zn, Pb (post-controlling monitor-routine)	yes
71	2. KÖBÁL	Kecskemét		Tisa	Unknown	hydrocarbon (CH), heavy-metal (technical manipulation liable)	no
72	3. MOL Inc.	Szeged-Tápé		Tisa	Unknown	hydrocarbon (CH) (experimental factra liable)	yes
73	4. Lawrence Inc.	Hódmezovásárhely		Tisa	Unknown	phosphate (experimental factra liable)	no
74	5. Budalakk Ltd	Szeged		Tisa	Unknown	total aliphatic hydrocarbon, benzene and alkyl-benzenes (BTEX), lead, (experimental factra liable)	yes
75	6. Silver-Szeged	Szeged		Tisa	Unknown	experimental factra liable	yes
	. Old military site						
76	7. MH Fuel depot	Kecskemét			Unknown	total aliphatic hydrocarbon (TPH), benzene and alkyl-benzenes (BTEX), (technical manipulation liable)	no

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Remark	
NAMING		LOCATION	Grid-lines X= ; Y=;			Estimated amount of dangerous substances	Floods
	. Agricultural landfill						
77	*8.* Natura	Kecskemét			Unknown	total aliphatic hydrocarbon (TPH), Ba, free cyanide, all cyanide	no
78	*9.* Termál Kertészeti Szövetkezet	Szentes		Tisa	Unknown	total aliphatic hydrocarbon (TPH), chloro~, triasine~, carbamate derivatives (technical manipulation liable)	yes
	. KÖRÖS ENVIRONMENTAL INSPECTORATES AREA						
	. Industrial deposit						
79	*1.* Chrome leather waste	Körösladány		Fast Körös	Unknown	earth mix leather waste 70 t	no
80	*2.* Drilling und reservoir	Füzesgyarmat			Unknown	drilling sludge 106 000 t	no
	. Communal waste storage						
81	*3.* Establishment organic waste	Békés	X=807 170 Y=160 480	Bofoki canal (8280) Körös	Unknown	20 500 t	yes
82	*4.* Establishmen organic waste	Békéscsaba	X=806 600 Y=148 550	Nádas canal	Low	reclaimed waste storage 780 000 m^3	yes
83	*5.* Establishmen organic waste	Gyula	X=818 000 Y=146 100	White Körös	Low	273 773 t	yes

A 1.4 OCS in Moldova

Inventory of the water endangering old depositions in the Prut River Basin 1/2

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
Agricultural landfill	Vil. Cahslita-Prut	Prut - 11,5 km	medium	Pesticides – 6 t Estimated vulnerability by floods - unknown
	Vil. Mereseni	Sarata – 57,5 km Prut – 187 km	low	Pesticides – 3 t Low
	Vil .Cneazevca	Sarata – 32 km Prut – 187 km	high	Pesticides – 11,5 t Low
	Town Leova	Prut – 246 km	high	Pesticides – 34,85 t unknown
	Vil. Filipeni	Sarata – 8 km Prut – 187 km	low	Pesticides - 2,7 Unknown
	Vil. Vozneseni	Sarata – 26 km Prut – 187 km	low	Pesticides - 2,4 t Unknown

Inventory of the water endangering old depositions in the Prut River Basin 2/2

Old deposition site	**Location**	**Recipient river (length of stream in km)**	**Estimated Risk**	**Remark**
	Vil. Jargara	Tigheci –30 km Prut – 151 km	low	Pesticides – 3 t Unknown
	Vil. Sofia	Lapusna –40 km Prut – 239 km	low	Pesticides – 4 t Unknown
	Vil. Pascani	Lapusna – 52 km Prut – 239 km	low	Pesticides – 3,6 t Unknown
	District Nisporeni	Narnova – 49 Prut – 278 km	high	Pesticides – 37,4 t Unknown
	District Briceni	Vilia –50 km Prut – 637 km	high	Pesticides – 78,7 t Unknown
	District Ungheni	Delia – 30 km Prut – 385 km	high	Pesticides - 53,2 Unknown

A 1.5 OCS in Slovenia/ Statement to the local status

Slovenia wrote the following statement to Mr. Liska from the ICPDR:

"*…regarding the preparation of the Inventory on old contaminated sites using the Austrian criteria I am informing you, that our experts from Ministry of Environment and Spatial Planning checked again Slovenian part of the Danube river basin. So far they didn't registered old contaminated sites with characteristic to fulfil the Austrian criteria, excluding two locations in Drava river basin, already included in ARS inventory. Taking in to account the Austrian criteria Slovenian experts are not able to fulfil the table in Annex 5: Format of the Inventory of the water endangering old depositions in the Danube River Basin.…"*

A 1.6 OCS in Slovakia

Old deposition site	Location	Recipient /r.km/	Estimated Risk	Remark
industrial waste deposit	Liptovsky Mikulas	Vah	medium	deposit of waste and sludge
deposit of fouling waste	Vrútky	Vah	low	closed deposit of fouling industrial sludge
deposit of fouling waste	Trstena	Oravica	low	closed deposit of fouling industrial sludge
industrial waste deposit	Nizna	Bezmenny creek	low	sludge deposit from operation of surface praparation
industrial waste deposit	Siroka	Bezmenny creek	low	deposit of industrial waste arsenical
deposit of common and industrial waste	Turzovka	Semetes /in tube/	medium	leaking tube line
deposit of common and industrial waste	Kysucke nove Mesto	Kysuca	medium	closed deposit of fouling industrial sludge
industrial waste deposit	Povazska Bystrica	Ziar /in tube/	low	closed deposit of fly-ash of refuse incinerating plant
deposit - industrial	Chemko Strazske	Ondava 16,2 rkm	high	leach out during flood
sludge deposit - sludge reservoir	Chemko Strazske	Ondava 43,2 rkm	high	leach out during flood
sludge deposit	Krompachy	Hornad 186,0 rkm	high	leach out during flood
sludge deposit - links bank meander	Vranov n. toplov	Ondava 48,7 rkm	high	leach out during flood
deposit of gudrons PETROCHEMA	Predajna	Hron 208 r.km	very high	cca 120000 m3, overspill by heavy raining
deposit of gudrons	PETROCHEMA area	Hron 206 r.km	very high	cca 50000 m3 , washed up during flood
deposit of liqued waste,fenole,formaldehyde	Bucina, Horny Sturec	Zolna 1,5 r.km	very high	cca 20000 m3
red-sludge bed, danger waste deposit	ZSNP area, Ziar n./Hronom	Hron 125,3 r.km	very high	cca 1 million. m3 alkaline water
deposit of danger waste, oil waste	A.S.A. Zohor	Malina 6,0 r.km	high	deposit of cca 350000 tons
NCHZ Novaky	Novaky	Nitra 123 r.km	very high	deposit of calc-sludge
ENO Zemianske Kostolany	Zemianske Kostolany	Nitra 128 r.km	high	deposit of fly-ash
DUSLO Sala	Trnovec nad Vahom	Vah 54 r.km	high	sludge bed
Drotovna Hlohovec	Horne Zelenice	Vah 97 r.km	high	Fe- sludge bed
VAB Sipox	Banovce nad Bebravou	Radisa 3,6 r.km	high	waste of galvanic salts, oil waste

A 1.7 OCS in Romania

No.	County	Location site	Distance to receiver river (m)	Deposit type	Estimated risk*	Waste type	Waste code according European Catalogue of Wastes	Actual capacity (m3)
1	Dambovita	Targoviste	Ilfov brook, 800	hazardous wastes	high	not specified (waste solutions and cyanuric muds (alkalines) with heavy metals others than chromium)	110101	6
2	Iasi	Blagesti	Siret River, 500	industrial wastes	low	wastes from sugar processing	020400	100000
3	Giurgiu	Giurgiu	Danube, 3000	industrial wastes	high	**organic solvents, washing liquids and mother solutions**	070104	3000
4	Dambovita	Targoviste	not specified	hazardous wastes	high	not specified (**waste solutions and cyanuric muds (alkalines) with heavy metals others than chromium, wastes solutions and muds containing chromium but without cyanides**)	110101, 110103	10.5
5	Vrancea	Nanesti	Siret River, 600	underground deposit	high	not specified (wastes from chemical treatments)	020703	160
6	Dambovita	Gaesti	Arges River, 1100	hazardous wastes	high	not specified (muds from industrial waste water treatment)	190804	30.6
7	Vrancea	Focsani	not specified	underground deposit	high	not specified (wastes from chemical treatments)	020703	144
8	Dambovita	Targoviste	Ilfov brook, 1500	hazardous wastes	high	not specified (**waste solutions and muds containing chromium but without cyanides**)	110103	3028
9	Dambovita	Fieni	Ialomita River, 180	hazardous wastes	high	not specified (**waste solutions and muds containing chromium but without cyanides**)	110103	20
10	Vrancea	Odobesti	Milcov River, 1500	underground deposit	high	not specified (wastes from chemical treatments)	020703	468
11	Dolj	Calafat	Danube, 250	industrial wastes	low	Wastes from sugar beet processing		435000
12	Constanta	Medgidia	Danube-Black Sea Channel,500	industrial wastes	unknown	Wastes from ligands manufacturing	101300	100000
13	Hunedoara	Mintia	Mures River, 500	slag and ash pond	unknown	fireplace ash	100101	9700000
14	Dolj	Calafat	Danube, 3000	slag and ash pond	unknown	Slag, ashes from coal burning	100100	655000
15	Hunedoara	Calan	Strei River, 3500	slag and ash pond	high	not processed slag, lining and refractory waste materials, furnace slag, foundry shapes containing organic ligands,wastes from mixture preparation previously thermic processing, other tars	100202, 100206, 100903, 101003, 050603, 100901, 101001	1300000
16	Teleorman	Turnu Magurele	Danube, 150	pyrite ash pond	high	not specified (**wastes containing metals**)	060400	1900000

No.	County	Location site	Distance to receiver river (m)	Deposit type	Estimated risk*	Waste type	Waste code according European Catalogue of Wastes	Actual capacity (m3)
17	Bacau	Bacau	Bistrita River, 3000	industrial wastes	low	wood processing	not specified	40000
18	Sibiu	Copsa Mica	Tarnava Mare River, 50; Visa brook, 2	industrial wastes	high	**slags from primary and secondary melting, other not specified inorganic wastes**, other inorganic matters from thermic processes as susspenssions or dust,iron and steel)	100501, 060199, 100504, 170405, 170701	1350000
19	Hunedoara	Pojoga	Mures River, 1000	sterile pond	low	Wastes from nonferrous ores processing	010102	32000
20	Tulcea	Turcoaia	Old Danube-Macin Arm,5000	sterile pond	unknown	not specified	not specified	440000
21	Bacau	Letea Veche	Siret River,1.5	slag and ash pond	unknown	fuel burning	100000	13150000
22	Dambovita	Doicesti	Ialomita River, 50	slag and ash pond	unknown	not specified (fireplace ash)	100101	500000
23	Dambovita	Targoviste	Ialomita River, 200	slag and ash pond	unknown	not specified (wastes from ferrous pieces foundry, some of them might be dangerous)	100900	12000

* risk was estimated as being "low" or "high" considering European Catalogue of Wastes classification of as dangerous or not

A 1.8 OCS in Ukraine

The Data are takenfrom the head of Zakarpatian region authority of MENR - I.. Rozsoxa.(Translated by Shmurak)

Table 1.8-1: OCS in the upper part of Ukrainian Danuba basin

No.	County	Location site	Distance to receiver river (m)	Recipient river (length of stream in km)	Deposit type	Estimated risk*	Waste type	Waste code according European Catalogue of Wastes	Actual capacity (m3)
1	Makarivskiy rajon, village Rakoshino	Rakoshinskiy administration	300	river Stara	wastes	Possibly in big water times	Solid wastes	1.48.21	2500
2	Mykachivskiy rajon, village Znjatsevo	Znjatsevska administration	150	meliorate channel	wastes	Possibly in big water times	Solid wastes	1.48.21	2000
3	Mykachivskiy rajon, village Vilxovutsa	Bystritsa administration	150	river Latoritsa	wastes	Possibly in big water times	Solid wastes	1.48.21	2000
4	village of town type Perechin	the forest "Z atova", str/ Budivelnikov, 1	600	river Uzh	wastes	Possibly in big water times	Solid wastes	1.48.21	30000
5	Xystskiy rajon, village of town type Vyshkovo-Jablunitsa	Road Vyshkovo-Jablunivka	800	river Tisa	surface wastes	Possibly in big water times on river Tisa	Solid wastes	1.48.21	1200

A 1.9 CS in Bosnia, Bulgaria, Croatia, Germany and Serbia

No data received in February 2003

Annex 2

Results of the inventory end of May 2003 and Additional or Modified Lists of CS

2.1 CS in Austria

Results not considering the flood-proneness

location/ name	Registry No	Grid system (Gauß-Krüger)	river	old deposit or old industrial site	branch	deposit type	in use since/ in the timeframe	hazardous substances	r0/ estimated risk factor	area in sqm	capacity in m³	M1	Endangered by Floods, Flood frequency
Leather factory Neuner	K22	M31, x= 5166094, y= 75848	Glan	industrial site	Lederverarbeitung		1922-1989	Chrom	4.5	120,000		50	
Landfill Roßwiese	K7	M31, x= 5192050, y= 85950	Gurk	deposit		Industriemüll	1950-1992	Metalle, Mineralisierung	5.0		500,000	55	
lime dump site Brückl I/II	K20	M31, x= 5178385, y= 91658	Gurk	deposit		Industrieabfälle, Bauschutt, Aushubmaterial	1926-1981	CKW (Tetrachlorethen, Trichlorethen, Hexachlorbutadien)	4.5		250,000	50	
Donau Chemie Brückl	K5	M31, x= 5177850, y= 91450	Gurk	industrial site	Chemische Grundstoffindustrie		1909-1989	CKW, Trichlorethen, Tetrachlorethen, Hexachlorbutadien	6.0	50,000		50	
Industrial deposit Heraklithwerke Ferndorf	K21	M31, x= 5177019, y= 22827	Drau	deposit		Industrieabfälle	1961-1989	Magnesium, Sulfat	3.5		500,000	40	
BBU Metallurgy factory Arnoldstein	K15	M31, x= 5157750, y= 28166	Gailitz/ Gail	industrial site	Chemische Grundstoffindustrie, Metallerzeugung		1882-1989	Metalle	5.0	300,000		50	
refinery Tuttendorfer Breite	N16	M34, x= 5355250, y= 250	Danube	industrial site	Mineralöl-Raffinerie		1923-1960/61	Mineralöl, CKW	4.5	180,000		50	
Shipyard Korneuburg	N33	M34, x= 5356050, y= -1100	Danube	industrial site	Schiffbau		1845-1994	Metalle, Mineralöl	4.0	200,000		50	
Tankfarm Mare	N46	M34, x= 5328350, y= -1250	Danube	industrial site	Mineralöllager		1930-1990	Mineralöl	4.0	10,000		50	
sports field Wiener Neudorf	N39	M34, x= 5328350, y= -1200	Krottenbach	deposit		Aushubmaterial, Bauschutt, Hausmüll	1963-1970	Deponiegas, erhöhte Mineralisation, reduzierende Verhältnisse	2.5		430,000	28	
Landfill Wiener Neudorf	N37	M34, x= 5328350, y= -1200	Krottenbach	deposit		Aushubmaterial, Bauschutt, Hausmüll	1963-1970	erhöhte Mineralisation, reduzierende Verhältnisse	3.0		870,000	40	
refinery Vösendorf	N20	M34, x= 5331650, y= -1200	Petersbach	industrial site	Mineralöl-Raffinerie		1920-1960	Mineralöl, PAK	4.5	145,000		50	

location/ name	Registry No	Grid system (Gauß-Krüger)	river	old deposit or old industrial site	branch	deposit type	in use since/ in the timeframe	hazardous substances	r0/ estimated risk factor	area in sqm	capacity in m³	M1	Endangered by Floods, Flood frequency
Landfill Tulln	N49	M34, x= 5356960, y= -20420	Danube	deposit		Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1972-1984	reduzierende Verhältnisse, erhöhte Mineralisierung	3.5		200,000	42	
Kapellerfeld	N12	M34, x= 5352100, y= 11100	Marchfeldkanal	deposit		Hausmüll	1966-1985	erhöhte Mineralisierung, CKW	4.0		2,000,000	49	
Landfill MA 48 - Zwölfaxing	N41	M34, x= 5330856, y= 10429	Mitterbach	deposit		Aushubmaterial, Bauschutt, Hausmüll	1977-1989	Deponiegas, erhöhte Mineralisation, reduzierende Verhältnisse	4.0		450,000	47	
ÖMV-refinery Schwechat	N18	M34, x= 5334000, y= 12000	Danube	industrial site	Mineralöl-Raffinerie		1930-1989	Mineralöl	5.0	1,500,000		50	
waste deposit S.A.D.	N7	M34, x= 5295000, y= -1200	Leitha	deposit		Industrie-/Gewerbemüll, gefährliche Abfälle	1973-1989	CKW	5.0		700,000	55	
Chemical site Linz	O44	M34, x= 5350500, y= 74000	Danube	industrial site	Chemische Grundstoffindustrie		1942-1989	CKW, BTX	5.0	850,000		55	
Landfill Pill	T7	M31, x= 5243100, y= 10100	Inn	deposit		Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1973-1990	erhöhte Mineralisierung, reduzierende Verhältnisse	4.0		1,000,000	49	
EBS-BP-TKV	W1	M34, x= 5337400, y= 10000	Danube	industrial site	Mineralöllagerung, Tierkörperverwertung		end of 19th century-1989	Mineralöl, CKW	5.5	200,000		50	
Gas works Simmering	W18	M34, x= 5338402, y= 6854	Danube	industrial site	Gaswerk		1900-1975	PAK, Cyanid, Mineralöl, Phenole,Ammonium, Sulfat	5.5	325,000		50	
Teerag-Asdag-Simmering	W21	M34, x= 5338000, y= 8600	Danube	industrial site	Teerverarbeitung		1914-1989	PAK, Phenole, BTX	5.5	130,000		50	
Tankfarm Lobau	W12	M34, x= 5337100, y= 13000	Danube	industrial site	Tanklager für Mineralölprodukte		1934-1989	Mineralöl, Kohlenwasserstoffe	5.0	1,000,000		50	
Siebenhirten	W8	M34, x= 5333000, y= -2800	Liesing	industrial site	Chemische Grundstoffindustrie		ca. 1828-1989	Cyanid, Kohlenwasserstoffe, Phenol, Ammonium, Nitrit, Sulfat	5.0	150,000		50	

Results considering the flood-proneness

Country	Region	county	community	location/ name	Registry No	Grid system (Gauß-Krüger)	river	old deposit or old industrial site	branch	deposit type	in use since/ in the timeframe	hazardous substances	dl/ estimated risk factor	area in sqm	capacity in m³	M1	Endangered by Floods, Flood frequency
Austria	Kärnten	Klagenfurt	Klagenfurt	Leather factory Neuner	K22	M31, x= 5169094, y= 75848	Glan	industrial site	Lederverarbeitung		1922-1989	Chrom	4,5	120.000		50	LOW
Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	K7	M31, x= 5192050, y= 85950	Gurk	deposit		Industriemüll	1950-1992	Metalle, Mineralisierung	5,0		500.000	55	LOW
Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl III	K20	M31, x= 5176385, y= 91658	Gurk	deposit		Industrieabfälle, Bauschutt, Aushubmaterial	1926-1981	CKW (Tetrachlorethen, Trichlorethen, Hexachlorbutadien)	4,5		250.000	50	LOW
Austria	Kärnten	Sankt Veit an der Glan	Brückl	Donau Chemie Brückl	K5	M31, x= 5177850, y= 91450	Gurk	industrial site	Chemische Grundstoffindustrie		1909-1989	CKW, Trichlorethen, Tetrachlorethen, Hexachlorbutadien	6,0	50.000		50	MIDDLE
Austria	Kärnten	Villach Land	Ferndorf	Industrial deposit Heraklithwerke Ferndorf	K21	M31, x= 5177019, y= 22827	Drau	deposit		Industrieabfälle	1961-1989	Magnesium, Sulfat	3,5		500.000	40	LOW
Austria	Niederösterreich	Korneuburg	Korneuburg	refinery Tuttendorfer Breite	N16	M34, x= 5355250, y= 250	Danube	industrial site	Mineralöl-Raffinerie		1923-1960/61	Mineralöl, CKW	4,5	180.000		50	LOW
Austria	Niederösterreich	Korneuburg	Korneuburg	Shipyard Korneuburg	N33	M34, x= 5356050, y= -1100	Danube	industrial site	Schiffbau		1845-1994	Metalle, Mineralöl	4,0	200.000		50	LARGE
Austria	Niederösterreich	Korneuburg	Korneuburg	Tankfarm Mars	N45	M34, x= 5358350, y= -1250	Danube	industrial site	Mineralöllager		1930-1990	Mineralöl	4,0	10.000		50	LARGE
Austria	Niederösterreich	Mödling	Vösendorf	refinery Vösendorf	N20	M34, x= 5331650, y= -1200	Petersbach	industrial site	Mineralöl-Raffinerie		1920-1960	Mineralöl, PAK	4,5	145.000		50	LOW
Austria	Niederösterreich	Tulln	Tulln	Landfill Tulln	N49	M34, x= 5356960, y= -20420	Danube	deposit		Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1972-1984	reduzierende Verhältnisse, erhöhte Mineralisierung	3,5		200.000	42	LARGE
Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	T7	M31, x= 5243100, y= 10100	Inn	deposit		Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1973-1990	erhöhte Mineralisierung, reduzierende Verhältnisse	4,0		1.000.000	49	LOW
Austria	Wien	11. Simmering	Wien	EBS-BP-TKV	W1	M34, x= 5337400, y= 10000	Danube	industrial site	Mineralöllagerung, Tierkörperverwertung		end of 19th century-1989	Mineralöl, CKW	5,5	200.000		50	LOW
Austria	Wien	11. Simmering	Wien	Gas works Simmering	W18	M34, x= 5338402, y= 8854	Danube	industrial site	Gaswerk		1900-1975	PAK, Cyanid, Mineralöl, Phenole,Ammonium, Sulfat	5,5	325.000		50	LOW
Austria	Wien	11. Simmering	Wien	Teerag-Asdag-Simmering	W21	M34, x= 5339000, y= 8600	Danube	industrial site	Teerverarbeitung		1914-1989	PAK, Phenole, BTX	5,5	130.000		50	LOW
Austria	Wien	22. Donaustadt	Wien	Tankfarm Lobau	W12	M34, x= 5337100, y= 13000	Danube	industrial site	Tanklager für Mineralölprodukte		1934-1989	Mineralöl, Kohlenwasserstoffe	5,0	1.000.000		50	LOW
Austria	Wien	23. Liesing	Wien	Siebenhirten	W8	M34, x= 5339000, y= -2800	Liesing	industrial site	Chemische Grundstoffindustrie		ca. 1828-1989	Cyanid, Kohlenwasserstoffe, Phenol, Ammonium, Nitrit, Sulfat	5,0	150.000		50	LOW

Results considering the modified m1-methodology

Rank	Country	Region	county	communit	location/ name	Endangered by Floods, Flood frequency	river	area in s	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Austria	Wien	22. Donaustadt	Wien	Tankfarm Lobau	1	Danube	1.000.000	5,0	50	59,00
2	Austria	Wien	11. Simmering	Wien	Gas works Simmering	1	Danube	325.000	5,0	50	58,00
3	Austria	Wien	11. Simmering	Wien	EBS-BP-TKV	1	Danube	200.000	5,0	50	58,00
4	Austria	Wien	23. Liesing	Wien	Siebenhirten	1	Liesing	150.000	5,0	50	58,00
5	Austria	Wien	11. Simmering	Wien	Teerag-Asdag-Simmering	1	Danube	130.000	5,0	50	58,00
6	Austria	Niederöstereich	Korneuburg	Korneuburg	refinery Tuttendorfer Breite	1	Danube	180.000	4,5	50	58,00
7	Austria	Niederöstereich	Korneuburg	Korneuburg	Shipyard Korneuburg	3	Danube	200.000	4,0	50	57,00
8	Austria	Niederöstereich	Mödling	Vösendorf	refinery Vösendorf	1	Petersbach	145.000	4,5	50	57,00
9	Austria	Kärnten	Klagenfurt	Klagenfurt	Leather factory Neuner	1	Glan	120.000	4,5	50	57,00
10	Austria	Kärnten	Sankt Veit an der Glan	Brückl	Donau Chemie Brückl	2	Gurk	50.000	5,0	50	56,00

2.2 CS in Bosnia

According to available data there are no heavy contaminated sites on the presented area, which could cause significant contamination of the water due to flood impact.

2.3 CS in Bulgaria

Bulgaria delivered a detailed description of the pollution situation caused by pesticides. Considering the exclusion criteria none of the listed sites have a relevant risk potential in case of flooding. The risk of flooding is low on every site, so the Bulgarian site will not come to the fore in our investigation. Nevertheless the high toxic potential of the substances and the high amount of identified hazardous substances calls for more intention with regard to the right disposal route.

More information is to be seen in the sequencing chapter.

Stores for pesticides in the Danube River Basin- Bulgaria

Since 1990 in a result of changes in agricultural policy and land property cooperated unions had been dismissed. Stores for pesticides, in the past maintained within agricultural unions, had been left careless. Many of stores contain poisonous solid and liquid substances (also see Annex 2), some of them forbidden for further use with different rate of toxicity.

Status of buildings:

- unsafe (lack of guarding, which may create risk of fire and stealing of stored pesticides);
- unlocked doors and windows;
- damaged roof constructions (water endangering in rainy conditions).

Status of stored preparations:

- after expiry date (useless);
- damaged covers and packages;
- unknown substance;
- mixed pesticides;
- spilled substances around stores.

Since 1999 a method for insulated packaging and replacing of agrochemical pesticides has been implemented. The technology by “Balbok Engineering Co.” offered disposal of agrochemical waste in "BB cube"® containers.

The technology includes six steps of ecological management.

First step

Estimation of the waste quantity according to BalBok's technology.

Second step

Re-packaging of solid waste.

Third step

Treating liquid waste according to the technology. The final product is solid.

Fourth step

Filling "BB cube"® containers with re-packaged and treated waste.

Fifth step

Disposal of full "BB cube"® containers according to legal requirements.

Sixth step

Removing and neutralizing any harmful substances from the floor and walls of emptied stores and from polluted soil around the store according. Stores for pesticides in Bulgarian part of Danube River Basin are listed in the table beneath (Links: http://www.balbok.com/English/PesticideStorageE)

List of water endangering old depositions sites of pesticides in the Danube River Basin- Bulgaria

?	Regional Center	Location	Recipient river (length of stream in km)	Estimated amounts of pesticides, kg			Estimated vulnerability by floods
				Generally	Unknown substance	Unknown substance (liquid)	
1	Sofia (capital)	Chepintzi	Stari Iskar	13 5432			Low
2	Sofia	Novachene	Malki Iskar	2 319	2319		Low
3		Samokov 1	Iskar	8 000	8 000		Low
4		Samokov 2	Iskar	2 000	2 000		Low
5		Gara BOV	Iskar	1 125	1 125		Low
6	Vratza	Galiche	Skat	6 722	6 722		Low
7		Kreta	Iskar	1 000	1 000		Low
8		Oryahovo	Danube	5 000	4 900	100	Low
9		Ostrov	Danube	1 500	1 500		Low
10		Miziya	Skat	8 000	8 000		Low
11		Krushovitza	Skat	1 500	1 500		Low
12		Hairedin	Ogosta	5 000	4 900	100	Low
13		Mihailovo	Ogosta	5 000	4 850	150	Low
14		Harletz	Ogosta	33 000	33 000		Low

?	Regional Center	Location	Recipient river (length of stream in km)	Estimated amounts of pesticides, kg			Estimated vulnerability by floods
				Generally	Unknown substance	Unknown substance (liquid)	
15	Montana	Zamfir	Lom	4 000	4 000		Low
16		Lom 1	Lom	1 300	1 300		Low
17		Lom 2	Lom	1 700	1 700		Low
18		Staliiska mahala	Lom	3 700	1 700		Low
19		Vasilovtzi	Lom	25 000	25 000		Low
20	Vidin	Novoseltzi	Topolovetz	10 000	10 000		Low
21		Gradetz	Topolovetz	5 000	5 000		Low
22		Dimovo	Archar	7 000	4 000		Low
23		Slanotran	Danube	4 000	4 000		Low
24	Lovech	Letnitza	Osam	3 500			Low
25		Aleksandrovo	Osam	6 000	6 000		Low
26		Lovech 1	Osam	4530			Low
27		Lovech 2	Osam	1 000			Low
28		Bezhanovo	Vit	4 576	600		Low
29		Dermantzi	Vit	2 000	600		Low

?	Regional Center	Location	Recipient river (length of stream in km)	Estimated amounts of pesticides, kg			Estimated vulnerability by floods
				Generally	Unknown substance	Unknown substance (liquid)	
30		Aglen	Vit	2 900		400	Low
31	Veliko Tarnovo	Dolna Oryahovitza	Jantra	21 180	16 900	4 280	Low
32		Svishtov	Danube	3 280	2 000	1280	Low
33		Vardim	Danube	1 380	1 200	180	Low
34	Ruse	Krasen	Russenski Lom	2 256			Low
35		Marten	Danube	4 000			Low
36		Ruse	Danube	5 000			Low
37		Sredna Kula	Danube	2 690			Low

2.4 CS in Croatia

Inventory of the water endangering old depositions in the CROATIAN part Danube River BASIN

Old deposition type:

- . Contamination from old accidents
- . Industrial deposit
- . Old military site
- . Agricultural landfill
- . Old mining tailiing
- . Communal organic dump wastestorage

	Old deposition site			Recipient river (length of stream in km)	Estimated Risk	Remark	
	NAMING	LOCATION	Grid-lines X= ; Y= ;			Estimated amount of dangerous substances	Floods
	SAVA RIVER BASIN						
	. Industrial deposit						
1.	. . Reservoir	PLASKI		Dretulja, cca 780 km from Danube	low	250 m^3 waste lye (NaCa, pH 12.5)	no
2.	. . Industrial deposit	LEMIC BRDO/ KARLOVAC		Kupa, cca 700 km from Danube	low	old oil waste and communal wasre	no
3.	. Old military site	DATA UNKNOWN					
	DRAVA AND DANUBE RIVER BASIN						
4.	. Old military site	DATA UNKNOWN					

Note: Other sites are included in ARS inventory .

2.5 CS in Czech Republic

List of the Water Endangering Old Depositions in the Czech Part of Morava River Basin

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
Oil substances in the Velamos factory area	Loucna nad Desnou	Desna river (river km 26)	High	amount of several tons of oil substances affected by flood Q100
Sludge lagoons in the waste water treatment plant	Sumperk	Desna river (river km 6)	High	6 000 m3 of sludge with heavy metals affected by flood Q100
Toluene in the Farmak factory area	Olomouc	Morava river (river km 233)	Low (core wall)	amount of several tons of toluene affected by flood Q100
Oil substances in the Magneton factory area	Kromeríž	Morava river (river km 195)	Low (partial remedial works)	amount of several tons of oil substances affected by flood Q100
Oil substances in the Precheza factory area	Prerov	Becva river (river km 12)	Low (partial remedial works)	amount of several hundreds kg of oil substances affected by flood Q100
Oil substances, polycyclic aromatic hydrocarbons in the DEZA factory area	Valasske Mezirici	Becva river (river km 60)	Low (hydraulic blanket)	amount of several tons affected by flood Q100
Aliphatic chlorohydrocarbons in the MEP factory area	Postrelmov	Morava river (river km 300)	Low (partial remedial works)	amount of several tens kg affected by flood Q100
Old industrial dump	Slapanice	Ricka river (river km 12)	Low	amount of 10 m3 of tar affected by flood Q100

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
Old plant for chlorohydrocarbon regeneration	Letovice	Svitava river (river km 62)	Low	amount of 1 ton of chlorohydrocarbons affected by flood Q100
Chlorohydrocarbons in the Magneton factory area	Valasske Klobouky	Brumovka river (river km 9)	Low	amount of 500 kg of chlorohydrocarbons affected by flood Q100
Chlorohydrocarbons in the Mars factory area	Svratka	Svratka (river km 160)	Low	amount of 200 kg of chlorohydrocarbons affected by flood Q100
Old deposit	Pozdatky	local stream and Jihlava river (river km 90)	Low	unknown amount of sulphuric acid affected by flood Q100
Chlorohydrocarbons and heavy metals in the Zbrojovka factory area	Brno	Svitava river (river km 6)	Low	unknown amount affected by flood Q100
phosphates from fertilizer production in the Fosfa factory area	Postorna	Dyje river (river km 25)	Low	unknown amount affected by flood Q100

2.6 CS in Germany

Considering the exclusion criteria Germany could deliver only two risk spots. But the risk potential of the Federal State of Baden Wuertemberg was not taken into consideration.

Region	county	community	location/ name	Grid system [Gauss-Krüger]	Endangered by Floods, Flood frequency	distance in m	river	old deposit or old industrial site	in use since/ in the timeframe	waste	capacity in m³
Bavaria	Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd	R: 4543249 H: 5417000	every 21 - 100 years	200	Danube	old deposit	1946 until 1977	municipal waste, accompanied by construction waste and industrial waste	ca. 1.45 Mio
Bavaria	Dillingen	Dillingen	Hühnerwörth	R: 4390858 H: 5382545	every 21 - 100 years	200	Danube	old deposit	1960 until 1977	municipal waste	ca. 470000

2.7 CS in Hungary

INVENTORY OF WATER ENDANGERING OLD CONTAMINATED SITES IN THE HUNGARIAN PART OF THE DANUBE RIVER BASIN

Old deposition type:

. Industrial deposits . Other old deposits

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Estimated amount of dangerous substances	Estimated flood risk	Remarks
	NAME	LOCATION	Grid-lines X= ; Y=					
. INDUSTRIAL DEPOSITS								
1.	I-II Reservoir for red-dross	Almásfüzito 119/11 Hrsz	X=590 327 Y=265 665	Danube 1749-1761 (rkm)	Unknown	red-dross 450 000 m^3	yes	
2.	III. Reservoir for red-dross	Almásfüzito 118	X=590 300 Y=265 600	Danube 1749-1761 (rkm)	Unknown	red-dross 1 000 000 m^3	yes	
3.	IV. Reservoir for red-dross	Almásfüzito 06/12	X=590 300 Y=265 600	Danube 1749-1761 (rkm)	Unknown	red-dross 600 000 m^3	yes	
4.	V. Reservoir for red-dross	Almásfüzito 06/10	X=590 300 Y=265 600	Danube 1749-1761 (rkm)	Unknown	red-dross 800 000 m^3	yes	
5.	VI. Reservoir for red-dross	Almásfüzito 06/8	X=590 300 Y=265 600	Danube 1749-1761 (rkm)	Unknown	red-dross 1 800 000 m^3	yes	
6.	VII. Reservoir for red-dross	Almásfüzito 03/29,30,31	X=592 500 Y=265 000	Danube 1749-1761 (rkm)	Unknown	red-dross 3 250 000 m^3	yes	
7.	VIII. Reservoir for red-dross	Neszmély 0125	X=600 871 Y=264 058	Danube 1749-1761 (rkm)	Unknown	red-dross 5 000 000 m^3	yes	
8.	Fixon Bt. – Humiron Ltd. (power station)	Lorinci	X=697 50 Y=282 500	Zagyva	Low	slag and dust-ash deposit 5 000 000 m^3	no	
9.	Metallochemia Inc.	Budapest, XXII. Harangozó u.	X=644 200 Y=227 800	Danube	Low	metallurgical slag (S, Cn, FeO) 650.000 t	no	
10.	Bakonyi Eromu Inc. (power station)	Ajka	X=539 238 Y=198 151	Torna	Unknown	gray sludge 15 000 000 t	no	
11.	Magyar Aluminium Inc.	Ajka	X=534 000	Torna (52)	Low	reclaimed red-dross	no	

Old deposition site				Recipient river (length of stream in km)	Estimated Risk	Estimated amount of dangerous substances	Estimated flood risk	Remarks
	NAME	LOCATION	Grid-lines X= ; Y=					
	(aluminium industry)		Y=194 000	Marcal (97,8) Rába (204,6)		deposition (i.-VIII. dep.) 29 000 000 t		
12.	Dunaferr Inc. (metallurgical industry)	Dunaújváros	X=642 735 Y=174 625	Danube	High	industrial waste sludge 1 500 000 t	yes	
13.	Dunapack Inc. (paper industry)	Dunaújváros	X=642 735 Y=174 625	Danube (1573)	High	mixed industrial sludge 212 000 t	yes	
14.	ELEKTROLUX - LEHEL Ltd WDS-1 (machine industry)	Jászberény	X=711 216 Y=237 746	Zagyva (67) Tisa (336)	Low	polluted soil (chemical wastes) 155.000 m^3	no	
15.	TVM Inc. (chemical industrial plant)	Szolnok	X=732 950 Y=199 716	Tisa (332)	Low	polluted soil (chemical wastes) 600.000 t	yes	
16.	Béghin-Say Cukorgyár Inc. (Sugar factory)	Szolnok	X=734 750 Y=200 250	Tisa (330)	High	waste-water sedimentation pond 1.300.000 m^3	yes	
17.	Tisa Chemical Factory	Tiszaújváros	x=798 042 Y=287 515	Tisa (484)	Low	industrial waste deposit 211.000 m^3	yes	
18.	AES borsodi Energetikai Ltd Tiszapalkonyai Hoeromu	Tiszaújváros (power station)	X=800 150 Y=286 711	Tisa (483)	Low	slurry 800.000 t lag-dust-ash 1.400.000 t	yes	
	. OTHER OLD DEPOSITS							
1.	Former military Airport	Tököl	X=644 156 Y=217 561	Danube	Low	hydrocarbon (CH) polluted soil: 308.000 m^3 hydrocarbon (CH) pollutec groundwater: 209.900 m^3	no	
2.	Abandoned sewage sludge deposits	Budapest, Csepel-island Nord	X=651 740 Y=234 600	Danube	Low	heavy metal and hydrocarbon (CH) pollution, organic compounds 300.000 m^3	no	
3.	Dangerous mixed municipal waste deposition	Gyula	X=818 000 Y=146 100	White Körös	Low	mixed dangerous deposit 273 773 m^3	yes	
4.	Municipal waste deposition	Mohács	X=622 150 Y= 74 880	Danube (1445)	Low	communal organic deposit 370 000 m^3	no	

2.8 CS in Moldova

Inventory of the water endangering old depositions in the Prut River Basin

Old deposition site	Location	Recipient river (length of stream in km)	Estimated Risk	Remark
➢ Agricultural landfill	Vil. Cahslita-Prut	Prut - 11,5 km	medium	➢ Pesticides – 6 t ➢ Estimated vulnerability by floods - unknown
	Vil. Mereseni	Sarata – 57,5 km Prut – 187 km	low	➢ Pesticides – 3 t ➢ Low
	Vil .Cneazevca	Sarata – 32 km Prut – 187 km	high	➢ Pesticides – 11,5 t ➢ Low
	Town Leova	Prut – 246 km	high	➢ Pesticides – 34,85 t ➢ unknown
	Vil. Filipeni	Sarata – 8 km Prut – 187 km	low	➢ Pesticides - 2,7 ➢ Unknown
	Vil. Vozneseni	Sarata – 26 km Prut – 187 km	low	➢ Pesticides - 2,4 t ➢ Unknown
	Vil. Jargara	Tigheci –30 km Prut – 151 km	low	➢ Pesticides – 3 t ➢ Unknown
	Vil. Sofia	Lapusna –40 km Prut – 239 km	low	➢ Pesticides – 4 t ➢ Unknown
	Vil. Pascani	Lapusna – 52 km Prut – 239 km	low	➢ Pesticides – 3,6 t ➢ Unknown
	District Nisporeni	Narnova – 49 Prut – 278 km	high	➢ Pesticides – 37,4 t ➢ Unknown
	District Briceni	Vilia –50 km Prut – 637 km	high	➢ Pesticides – 78,7 t ➢ Unknown
	District Ungheni	Delia – 30 km Prut – 385 km	high	➢ Pesticides - 53,2 ➢ Unknown

2.9 CS in Serbia

No data received

2.10 CS in Slovakia

Location	Estimated Risk	Storage time	Volume	Remark
Skladka odpadov OFZ, Siroka	low	since 1965	600000 m3	deposit of industrial arsenical waste
Skladka TKO, Turzovka	medium	1968-2000	105000 m3	leaking tube line
TKO, Kysucke Nove Mesto	medium	1960-1998	150000 m3	closed deposit of fouling industrial sludge
Teplaren, Povazska Bystrica	low	1978-2000	345000 m3	closed deposit of fly-ash of refuse inicinerating plant
CHEMKO, Strazske	high	since 1955	800000 m3	leach out during flood
CHEMKO, Strazske	high	since 1959	600000 m3	leach out during flood
KOVOHUTY, Krompachy	high	since 1967	285000 m3	leach out during flood
BUKOCEL, Vranov n.Toplou	high	since 1983	153000 m3	leach out during flood
PETROCHEMA, Predajna	very high	since 1964	120000 m3	overspill by heavy raining
PETROCHEMA, Dubova	very high	since 1954	50000 m3	washed up during flood
BUCINA, Horny Sturec	very high	since 1950	20000 m3	industrial liquid waste
ZSNP, Ziar n./Hronom	very high	since 1957	1000000 m3	alkaline water
A.S.A. Zohor	high	since 1996	350000 m3	deposit of mixed danger waste
NCHZ, Novaky	very high	since 1968	12000000 m3	deposit of calc-sludge
ENO, Zemianske Kostolany	high	since 1965	300000 m3	deposit of fly-ash
DUSLO, Šala	high	since 1980	750000 m3	sludge bed
DROTOVNE, Hlohovec	high	since 1962	160000 m3	Fe- sludge bed
VAB SIPOX , Banovce n.Bebravou	high	since 1980		galvanic salts waste, oil waste

2.11. CS in Ukraine

Data from head of Zakarpatian region authority of MENR - I.. Rozsoxa (Translated by Shmurak)i

Table 2.11-1: (upper part of Ukrainian Danube basin)

No.	County	Location site	Distance to receiver river (m)	Recipient river (length of stream in km)	Deposit type	Estimated risk*	Waste type	Waste code according European Catalogue of Wastes	Actual capacity (m3)
1	Makarivskiy rajon, village Rakoshino	Rakoshinskiy administration	300	river Stara	wastes	Possibly in big water times	Solid wastes	1.48.21	2500
	Mykachivskiy rajon, village Znjatsevo	Znjatsevska administration	150	meliorate channel	wastes	Possibly in big water times	Solid wastes	1.48.21	2000
	Mykachivskiy rajon, village Vilxovutsa	Bystritsa administration	150	river Latoritsa	wastes	Possibly in big water times	Solid wastes	1.48.21	2000
	village of town type Perechin	the forest "Zatova", str/ Budivelnikov, 1	600	river Uzh	wastes	Possibly in big water times	Solid wastes	1.48.21	30000
	Xystskiy rajon, village of town type Vyshkovo-Jablunitsa	Road Vyshkovo-Jablunivka	800	river Tisa	surface wastes	Possibly in big water times on river Tisa	Solid wastes	1.48.21	1200

Annex 3

Results of the Ranking of CS in Flood Risk Areas with Regard to their Toxic Potential

Table 3-1: Ranked CS Considering the Estimated Risk Potential according to the old m1-methodology (List of 67 priority sites with contaminated volume > 100.000 m³)

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
1	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1,500,000	5	55
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd		1,450,000	5.0	55
3	Romania		Sibiu		Copsa Mica	industrial waste	1,350,000	5	55
4	Romania		Hunedoara		Calan	slag and ash pond	1,300,000	5	55
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	350000	5	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55
9	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200,000	5	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		23300 per day	4	55
11	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industriemüll	500,000	5.0	50
12	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl I/II	Industrieabfälle, Bauschutt, Aushubmaterial	250,000	4.5	50
13	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1,000,000	4.0	50
14	Austria	Niederöstereich	Tulln	Tulln	Landfill Tulln	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	200,000	3.5	50
15	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	Bakonyi Eromu Inc.	gray sludge	15,000,000	4	49
16	Romania		Bacau		Letea Veche	slag and ash pond	13,150,000	4	49
17	Hungary	Middle Danube Environmental Inspectorates area		Lorinci	Fixon Bt.-Humiron Ltd.	slag and dust ash	5,000,000	4	49

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m^3	Risk value r0	Risk Potential according old m1
18	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hoeromu		1,400,000	4	49
18	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc.(technology waste-water thickerer)	waste water sludgein lake	1,300,000	4	49
20	Romania		Teleorman		Tumu Magurele	pyrite ash pond	1,900,000	4	49
21	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49
22	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49
23	Slovakia				DUSLO, Šala	sludge bed	750000	4	49
24	Slovakia				CHEMKO, Strazske	leach out during flood	600000	4	49
25	Romania		Dolj		Calafat	slag and ash pond	655,000	4	49
26	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47
27	Slovakia				ENO, Zemianske Kostolany	deposit of fly - ash	300000	4	47
28	Slovakia				KOVOHUTY, Krompachy	leach out during flood	285000	4	47
29	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47
30	Germany		Dillingen	Dillingen	Hühnerwörth		470,000	4.0	47
31	Hungary	Central Transdanubian Environmental Iinspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212,000	4	47
32	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	Tisa Chemical Self-contained plant		211,000	4	47
33	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47
34	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	345000	4	47
35	Romania		Dolj		Calafat	industrial waste	435,000	4	47
36	Hungary	North Hungarian Environmental Inspectorate Area		Mezokövesd Airport	Mezokövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47
37	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abandon sewage sludge depots	300,000	4	47
38	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350,000	4	47

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m^3	Risk value r0	Risk Potential according old m1
39	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120,000	4	47
40	Austria	Kärnten	Villach Land	Ferndorf	Industrial deposit Heraklithwerke Ferndorf	Industrieabfälle	500,000	3.5	42
41	Slovakia				NCHZ, Novaky	deposit of calc-sludge	12000000	3	40
42	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 03/29,30,31	VII. Reservoir for red-dross	3,250,000	3	40
43	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	MAL Inc. I-VIII. store, reclaimed	red dross settlements	29,000,000	3	40
44	Romania		Hunedoara		Mintia	slag and ash pond	9700000	3	40
45	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 06/8	VI. Reservoir for red-dross	1,800,000	3	40
46	Hungary	Upper Danube Environmental Inspectorates area			Neszmély 0125	VIII. Reservoir for red-dross	5,000,000	3	40
47	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 118	III. Reservoir for red-dross	1,000,000	3	40
48	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 06/10	V. Reservoir for red-dross	800,000	3	40
49	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 06/12	IV. Reservoir for red-dross	600,000	3	40
50	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	TVM Inc. (waste of chemical industry)	polluted earth	600,000	3	40.0
51	Hungary	Körös Environmental Inspectorates Area		Békéscsaba	Establishmen organic waste	reclaimed waste storage	780,000	3	40
52	Hungary	Middle Danube Environmental Inspectorates area		Budapest, XXII. Harangozó u.	Metallochemia	metalslag	650,000	3	40
53	Slovakia				DROTOVNE, Hlohovec	Fe- sludge bed	160000	3	37
54	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzito 119/11 Hrsz	I-II Reservoir for red-dross	450,000	3	37
55	Slovakia				TKO, Kysucke Nove Mesto	closed deposit of fouling industrial sludge	150000	3	37
56	Hungary	North Hungarian Environmental Inspectorate Area		Tarnaszentmária	MH – Tarnaszentmária Fuel depot		69.000 and 69.000	4	37

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m^3	Risk value r0	Risk Potential according old m1
57	Hungary	North Hungarian Environmental Inspectorate Area		Mezokövesd Hrsz: 0456/2	MH – Mezokövesd Fuel depot „K" area		52.500 and 67.500	4	37
58	Hungary	Middle Danube Environmental Inspectorates area			Tököl		308000 and 209.900	3	37
59	Romania		Dambovita		Doicesti	slag and ash pond	500,000	3	37
60	Romania		Tulcea		Turcoaia	sterile pond	440000	3	37
61	Romania		Dolj		Calafat	industrial wastes	435000	3	37
62	Hungary	South Transdanubian Environmental Inspectorates Area		Mohács		settlement waste	370,000	3	37
63	Hungary	South Transdanubian Environmental Inspectorates Area		Barcs		settlement waste	300,000	3	37
64	Hungary	Körös Environmental Inspectorates Area		Gyula	Establishmen organic waste		273,773	3	37
65	Hungary	Middle Tisa Environmental Inspectorates Area		Jászberény	ELEKTROLUX - LEHEL Ltd WDS-1 (waste of chemical industry)	polluted earth	155,000	3	37.0
66	Hungary	South Transdanubian Environmental Inspectorates Area		Harkány		settlement waste	114,000	3	37
67	Hungary	South Transdanubian Environmental Inspectorates Area		Siklós		settlement waste	112,000	3	37

Rank	Country	Region	county	communit	location/ name	deposit type	capacity in m³	Risk value m	Risk Potential according old m1
1	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1.500.000	5	55
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd		1.450.000	5,0	55
3	Romania		Sibiu		Copsa Mica	industrial waste	1.350.000	5	55
4	Romania		Hunedoara		Calan	slag and ash pond	1.300.000	5	55
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	350000	5	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55
9	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200.000	5	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		23300 per day	4	55
11	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industriemüll	500.000	5,0	50
12	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl I/II	Industrieabfälle, Bauschutt, Aushubmaterial	250.000	4,5	50
13	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1.000.000	4,0	50
14	Austria	Niederöstereich	Tulln	Tulln	Landfill Tulln	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	200.000	3,5	50

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
15	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	Bakonyi Erőmű Inc.	gray sludge	15.000.000	4	49
16	Romania		Bacau		Letea Veche	slag and ash pond	13.150.000	4	49
17	Hungary	Middle Danube Environmental Inspectorates area		Lőrinci	Fixon Bt.-Humiron Ltd.	slag and dust ash	5.000.000	4	49
18	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hőerőmű		1.400.000	4	49
18	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc.(technology waste-water thickerer)	waste water sludgein lake	1.300.000	4	49
20	Romania		Teleorman		Tumu Magurele	pyrite ash pond	1.900.000	4	49
21	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49
22	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49
23	Slovakia				DUSLO, Šala	sludge bed	750000	4	49
24	Slovakia				CHEMKO, Strazske	leach out during	600000	4	49
25	Romania		Dolj		Calafat	slag and ash pond	655.000	4	49
26	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47
27	Slovakia				ENO, Zemianske Kostolany	deposit of fly-ash	300000	4	47
28	Slovakia				KOVOHUTY, Krompachy	leach out during flood	285000	4	47
29	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47
30	Germany		Dillingen	Dillingen	Hühnerwörth		470.000	4,0	47

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
31	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212.000	4	47
32	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	Tisa Chemical Self-contained plant		211.000	4	47
33	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47
34	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	345000	4	47
35	Romania		Dolj		Calafat	industrial waste	435.000	4	47
36	Hungary	North Hungarian Environmental Inspectorate Area		Mezőkövesd Air	Mezőkövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47
37	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abandon sewage sludge depots	300.000	4	47
38	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350.000	4	47
39	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120.000	4	47
40	Austria	Kärnten	Villach Land	Ferndorf	Industrial deposit Heraklithwerke Ferndorf	Industrieabfälle	500.000	3,5	42
41	Slovakia				NCHZ, Novaky	deposit of calc-sludge	12000000	3	40
42	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 03/29,30,31	VII. Reservoir for red-dross	3.250.000	3	40
43	Hungary	Central Transdanubian Environmental Inspectorates Area		Ajka	MAL Inc. I-VIII. store, reclaimed	red dross settlements	29.000.000	3	40
44	Romania		Hunedoara		Mintia	slag and ash pond	9700000	3	40
45	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/8	VI. Reservoir for red-dross	1.800.000	3	40

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
46	Hungary	Upper Danube Environmental Inspectorates area			Neszmély 0125	VIII. Reservoir for red-dross	5.000.000	3	40
47	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 118	III. Reservoir for red-dross	1.000.000	3	40
48	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/10	V. Reservoir for red-dross	800.000	3	40
49	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/12	IV. Reservoir for red-dross	600.000	3	40
50	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	TVM Inc. (waste of chemical industry)	polluted earth	600.000	3	40,0
51	Hungary	Körös Environmental Inspectorates Area		Békéscsaba	Establishmen organic waste	reclaimed waste storage	780.000	3	40
52	Hungary	Middle Danube Environmental Inspectorates area		Budapest, XXII. Harangozó u.	Metallochemia	metalslag	650.000	3	40
53	Slovakia				DROTOVNE, Hlohovec	Fe- sludge bed	160000	3	37
54	Hungary	Environmental Inspectorates			Almásfüzitő 119/11 Hrsz	I-II Reservoir for red-dross	450.000	3	37
55	Slovakia				TKO, Kysucke Nove Mesto	closed deposit of fouling industrial sludge	150000	3	37
56	Hungary	North Hungarian Environmental Inspectorate Area		Tarnaszentmári	MH – Tarnaszentmária Fuel depot		69.000 and 69.000	4	37
57	Hungary	North Hungarian Environmental Inspectorate Area		Mezőkövesd Hrs	MH – Mezőkövesd Fuel depot „K" area		52.500 and 67.500	4	37
58	Hungary	Middle Danube Environmental Inspectorates area			Tököl		308000 and 209.900	3	37
59	Romania		Dambovita		Doicesti	slag and ash pond	500.000	3	37
60	Romania		Tulcea		Turcoaia	sterile pond	440000	3	37

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
61	Romania		Dolj		Calafat	industrial wastes	435000	3	37
62	Hungary	South Transdanubian Environmental Inspectorates Area		Mohács		settlement waste	370.000	3	37
63	Hungary	South Transdanubian Environmental Inspectorates Area		Barcs		settlement waste	300.000	3	37
64	Hungary	Körös Environmental Inspectorates Area		Gyula	Establishmen organic waste		273.773	3	37
65	Hungary	Middle Tisa Environmental Inspectorates Area		Jászberény	ELEKTROLUX - LEHEL Ltd WDS-1 (waste of chemical industry)	polluted earth	155.000	3	37,0
66	Hungary	South Transdanubian Environmental Inspectorates Area		Harkány		settlement waste	114.000	3	37
67	Hungary	South Transdanubian Environmental Inspectorates Area		Siklós		settlement waste	112.000	3	37

Table 3-2: Ranked CS Considering the Estimated Risk Potential according to the modified m1-methodology (List priority sites)

3.2.1: Result of the ranking of the Austrian sites classified by surface area using the adapted methodology

Rank	Country	Region	county	community	location/ name	Endangered by Floods, Flood frequency	river	area in sqm	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Austria	Wien	22. Donaustadt	Wien	Tankfarm Lobau	1	Danube	1,000,000	5.0	50	59.00
2	Austria	Wien	11. Simmering	Wien	Gas works Simmering	1	Danube	325,000	5.0	50	58.00
3	Austria	Wien	11. Simmering	Wien	EBS-BP-TKV	1	Danube	200,000	5.0	50	58.00
4	Austria	Wien	23. Liesing	Wien	Siebenhirten	1	Liesing	150,000	5.0	50	58.00
5	Austria	Wien	11. Simmering	Wien	Teerag-Asdag-Simmering	1	Danube	130,000	5.0	50	58.00
6	Austria	Niederöstereich	Korneuburg	Korneuburg	refinery Tuttendorfer Breite	1	Danube	180,000	4.5	50	58.00
7	Austria	Niederöstereich	Korneuburg	Korneuburg	Shipyard Korneuburg	3	Danube	200,000	4.0	50	57.00
8	Austria	Niederöstereich	Mödling	Vösendorf	refinery Vösendorf	1	Petersbach	145,000	4.5	50	57.00
9	Austria	Kärnten	Klagenfurt	Klagenfurt	Leather factory Neuner	1	Glan	120,000	4.5	50	57.00
10	Austria	Kärnten	Sankt Veit an der Glan	Brückl	Donau Chemie Brückl	2	Gurk	50,000	5.0	50	56.00
11	Austria	Niederöstereich	Korneuburg	Korneuburg	Tankfarm Mare	3	Danube	10,000	4.0	50	51.00

Rank	Country	Region	County	Location/ Name	Flood Frequency	River	Area in mð	Risk Value r	Risk Potential old m	Risk Potential new m
	Austria	Wien	. Donaustadt	Tankfarm Lobau	low	Danube	. .	,		,
	Austria	Wien	. Simmering	Gas works Simmering	low	Danube	.	,		,
	Austria	Wien	. Simmering	EBS-BP-TKV	low	Danube	.	,		,
	Austria	Wien	. Liesing	Siebenhirten	low	Liesing	.	,		,
	Austria	Wien	. Simmering	Teerag-Asdag-Simmering	low	Danube	.	,		,
	Austria	Niederöstereich	Korneuburg	refinery Tuttendorfer Breite	low	Danube	.	,		,
	Austria	Niederöstereich	Korneuburg	Shipyard Korneuburg	high	Danube	.	,		,
	Austria	Niederöstereich	Mödling	refinery Vösendorf	low	Petersbach	.	,		,
	Austria	Kärnten	Klagenfurt	Leather factory Neuner	low	Glan	.	,		,
	Austria	Kärnten	Sankt Veit an der Glan	Donau Chemie Brückl	middle	Gurk	.	,		,
	Austria	Niederösterreich	Korneuburg	Tankfarm Mare	high	Danube	.	,		,

3.2.2 Result of the ranking of the sites classified by volume using the adapted methodology

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m^3	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1,500,000	5	55	57
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd		1,450,000	5.0	55	57
3	Romania		Sibiu		Copsa Mica	industrial waste	1,350,000	5	55	57
4	Romania		Hunedoara		Calan	slag and ash pond	1,300,000	5	55	57
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55	57
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	350000	5	55	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55	55
9	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industrie müll	500,000	5.0	50	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200,000	5	55	55
11	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	Bakonyi Eromu Inc.	gray sludge	15,000,000	4	49	53
12	Romania		Bacau		Letea Veche	slag and ash pond	13,150,000	4	49	53
13	Hungary	Middle Danube Environmental Inspectorates area		Lorinci	Fixon Bt.- Humiron Ltd.	slag and dust ash	5,000,000	4	49	53
14	Ukraine				The Odessa area Izmail Cellulose cardboard combine		23300 per day	4	55	53

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
15	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl I/II	Industrieabfälle, Bauschutt, Aushubmaterial	250,000	4.5	50	51
16	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hoeromu		1,400,000	4	49	50
17	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc.(technology waste-water thickerer)	waste water sludgein lake	1,300,000	4	49	50
18	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1,000,000	4.0	50	50
19	Romania		Teleorman		Tumu Magurele	pyrite ash pond	1,900,000	4	49	50
20	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49	50
21	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49	49
22	Slovakia				DUSLO, Šala	sludge bed	750000	4	49	49
23	Slovakia				CHEMKO, Strazske	leach out during flood	600000	4	49	49
24	Romania		Dolj		Calafat	slag and ash pond	655,000	4	49	49
25	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47	47
26	Slovakia				ENO, Zemianske Kostolany	deposit of fly-ash	300000	4	47	47
27	Slovakia				KOVOHUTY, Krompachy	leach out during flood	285000	4	47	47
28	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47	47
29	Germany		Dillingen	Dillingen	Hühnerwörth		470,000	4.0	47	47
30	Hungary	Central Transdanubian Environmental Iinspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212,000	4	47	47
31	Hungary	North Hungarian Environmental		Tiszaújváros	Tisa Chemical Self-contained plant		211,000	4	47	47

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
		Inspectorate Area								
32	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47	47
33	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	345000	4	47	47
34	Romania		Dolj		Calafat	slag and ash pond	655000	4	47	47
35	Hungary	North Hungarian Environmental Inspectorate Area		Mezokövesd Airport	Mezokövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47	47
36	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abandon sewage sludge depots	300,000	4	47	47
37	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350,000	4	47	47
38	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120,000	4	47	47

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1.500.000	5	55	57
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Petersw0hrd		1.450.000	5,0	55	57
3	Romania		Sibiu		Copsa Mica	industrial waste	1.350.000	5	55	57
4	Romania		Hunedoara		Calan	slag and ash pond	1.300.000	5	55	57
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55	57
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	350000	5	55	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55	55
9	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industrieöl	500.000	5,0	50	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200.000	5	55	55
11	Hungary	Central Transdanubian Environmental Inspectorates Area		Ajka	Bakonyi Erömü Inc.	gray sludge	15.000.000	4	49	53
12	Romania		Bacau		Letea Veche	slag and ash pond	13.160.000	4	49	53
13	Hungary	Middle Danube Environmental Inspectorates area		Lőrinci	Fixon Bt.-Humiron Ltd.	slag and dust ash	5.000.000	4	49	53
14	Ukraine				The Odessa area Izmail Cellulose cardboard combine		29300 per day	4	55	53

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
15	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl Mil	Industrieabfälle, Bauschutt, Aushubmaterial	250.000	4,5	50	51
16	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hőerőmű		1.400.000	4	49	50
17	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc. (technology waste-water thickener)	waste water sludgein lake	1.300.000	4	49	50
18	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1.000.000	4,0	50	50
19	Romania		Teleorman		Turnu Magurele	pyrite ash pond	1.900.000	4	49	50
20	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49	50
21	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49	49
22	Slovakia				DUSLO, Sala	sludge bed	750000	4	49	49
23	Slovakia				CHEMKO, Strazske	leach out during	600000	4	49	49
24	Romania		Dolj		Calafat	slag and ash pond	655.000	4	49	49

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
25	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47	47
26	Slovakia				ENO, Zemianske Kostolany	deposit of fly-ash	300000	4	47	47
27	Slovakia				KOVOHUTY, Krompachy	leach out during flood	266000	4	47	47
28	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47	47
29	Germany		Dillingen	Dillingen	Höhenworth		470.000	4,0	47	47
30	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212.000	4	47	47
31	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	Tisa Chemical Self-contained plant		211.000	4	47	47
32	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47	47
33	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	346000	4	47	47
34	Romania		Dolj		Calafat	slag and ash pond	656000	4	47	47
35	Hungary	North Hungarian Environmental Inspectorate Area		Mezökövesd Ar	Mezökövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47	47
36	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abandon sewage sludge depots	300.000	4	47	47
37	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350.000	4	47	47
38	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120.000	4	47	47

Annex 4

Results of the ARS inventory of Austria in 2003

Flfd.Nr.	Betrieb Name	Ort	Zweck des Betriebes	Kategorie Stoffmenge/Lager	Art des wassergefährdenden Stoffes	WGK	GSI	Gewässer
1	Agrolinz Melamin Ges.m.b.H	Linz	Chemie	11284	Kohlenmonoxid (0,4 to)	1	6,1	Donau
					Ammoniak (11210 to), Natriumnitrit (65 to), Formaldehyd (Konz. >=90 %) (7,5 to)	2		
					Hydrazin (1,2 to)	3		
				105	Kaliumnitrat (105 to)	1		
				1057	Ammoncarbonatlaugen (320 to), Ammoniakwasser (677 to), Diphenyl (40 to), Nickelverbindungen (19,6 to)	2		
3	Avanti International AG Zentraltanklager Lobau	Wien	Tanklager	61420	Diesel / Ofenöl (74.000 m3)	2	6,8	Donau
4	Biochemie Ges.m.b.H	Kundl	Chemie	>50000	Mengenschwellen überschreitung nach der Additionsregel	2	6,7	Wild schönauer Ache/Inn
				20	u.a. Bortrifluorid (17 to)	3		
				576	Methanol	1		
				>200	Mengenschwellen überschreitung nach der Additionsregel	2		
				>200	Mengenschwellen überschreitung nach der Additionsregel	2		
				>200	Mengenschwellen überschreitung nach der Additionsregel	2		
5	Chem. Farbenfabrik H.M.Habich GmbH	Weitenegg	Chemie/Farben	225	Diverse Stoffe R50/53	2	1,4	Donau
6	Chemson Polymer-Additive AG	Arnoldstein	Chemie	2300	Bleiverbindungen 2.300 t	2	5,4	Gailitz
7	Donau Chemie AG, Brückl	Brückl	Chemie	263	Chlor	2	4,4	Gurk
8	Donau Chemie AG, Pischelsdorf	Pischelsdorf	Chemie	4500	Schwefeldioxid	1	4,7	Perschling
9	Donauchem Handelsges.m.b.H, Lobgrundstraße	Wien	Chemikalienhandel	900	Methanol	1	5,4	Donau
				4200	Testbenzin, Shellsol, Kristallöl, Petroleum (total 2.400 to)	1		
					Kristallöl, Shellsol H, Shellsol A (total 1.800 to)	2		
				500	Shellsol AB (lt. Betrieb in Kat. 8)	2		

Flfd.Nr.	Betrieb Name	Ort	Zweck des Betriebes	Kategorie Stoff menge/Lager	Art des wassergefährdenden Stoffes	WGK	GSI	Gewässer
10	DSM Fine Chemicals Austria Ges.m.b.H	Linz	Chemie	>200	giftige Stoffe	2	4,3	Donau
11	Dynea Austria Ges.m.b.H (vorm. Krems Chemie)	Krems	Chemie	15335	Methanol (10100 to)	1	5,8	Donau
					Phenol (315 to), Formalin (4920 to)	2		
12	Esso Austria Ges.m.b.H Zentraltanklager Lobau	Wien	Tanklager	50000	Erdölprodukte	2	6,7	Donau
13	Eurofoam Ges.m.b.H Kremsmünster	Kremsmünster	Chemie	336	Toluylendiisocyanat	2	4,5	Krems
14	Eurofoam Ges.m.b.H.Linz	Linz	Chemie	152	Toluylendiisocyanat	2	4,2	Donau
15	Erdöllager Ges.m.b.H	Lannach	Tanklager	430000	Rohöl	3	8,6	Kainach
16	Furtenbach Ges.m.b.H	Wiener Neustadt	Giessereichemikalien	>200	Phenol (>200 to)	2	4,3	Leitha**)
17	Glanzstoff Austria Ges.m.b.H&Co KG	St. Pölten	Chemie	227	Schwefelkohlenstoff	2	4,4	Mühlbach Traisen
18	JLC-Chemie Handels Ges. m.b.H	Wiener Neustadt	Chemie	>200	Methanol	1	3,3	Leitha
19	Infineon Technologies Villach AG		Halbleiterfertigung	55	Flußsäure (7,6 to) und -zubereitungen (4,63 to) und weitere Stoffe. Aus Einzelstoffliste: Fluorwasserstoff und -zubereitungen (42 to)	1	2,8	Drau
					Diverse Stoffe (0,6 to)	2		
20	Isovolta Österreichische Isolierstoffwerke AG	Wr.Neudorf	Chemie	1481	Methanol (126 to), Phenolharz (460 to)	1	5,0	Mödling bach
					Formalin (400 to), Phenol (490 to), IPDI (3 to), Anilin (2 to)	2		
21	Johnson Controls Austria Ges.m.b.H	Mandling	Petrochemie	60	Desmodur (= TDI)	2	3,8	Enns
22	KCC Krems Chemie Chemical Services GmbH	Krems	Chemie	120	giftige und sehr giftige Stoffe	2	5,2	Donau
				1489	zB.: Xylol (1731 m3).	2		
23	Lenzing AG	Lenzing	Papier	2660	CS2 (Schwefelkohlenstoff)	2	5,5	Ager
				920	Schwefeldioxid (320 t)	1		
					Furfural (600 to)	2		

Flfd.Nr.	Betrieb Name	Ort	Zweck des Betriebes	Kategorie Stoffmenge/Lager	Art des wassergefährdenden Stoffes	WGK	GSI	Gewässer
24	LLT Lannacher Lager-und Transport Ges.m.b.H	Korneuburg	Pflanzenschutzmittel	>20	Pflanzenschutzmittel	3	4,3	Donau
25	M-Real (MODO PAPER)	Hallein	Papier	212	Schwefeldioxid	1	3,3	Salzach
26	Neuber Ges.m.b.H	Guntramsdorf	Chemie	43	Flusssäurelösung (40 to)	1	2,8	Mödling bach
					Toluoldiisocyanat (3 to)	2		
27	Nufarm Pflanzenschutz Ges.m.b.H & Co AG	Linz	Chemie	64	3,4-Dichlorphenylisocyanat (64,1 to). Anmerkung: nur einer dieser Stoffe gleichzeitig in der Anlage	2	5,1	Donau
				573	Schwefeldioxid (14,3 to)	1		
					Phenol (159 to), Monochloressigsäure, Schmelze (178,1 to), Monochloressigsäure, wässrige Lösung (164,4 to)	2		
					1,2-Dichlorethan(57,6 to)	3		
28	ÖCW Zweigniederlassung der Degussa CEE GmbH	Weißenstein o.d. Drau	Chemie	60	Naphthochinon (30 to)	2	5,0	Drau
					Acrolein (30 to)	3		
				1700	H2O2 (Wasserstoffperoxid) 1.500 to	1		
					Peressigsäure (200 to)	2		
				600	Acrylsäure (200 to)	1		
					Thioharnstoff (400 to)	2		
29	OMV Zentraltanklager St. Valentin	St. Valentin	Petrochemie/Tanklager	514000	Diverse Erdölprodukte	2	7,7	Donau
30	OMV Zentraltanklager Lobau	Wien	Petrochemie/Tanklager	800000	Diverse Erdölprodukte	2	7,9	Donau
31	Östereichische Novopan-Holzindustrie Ges.m.b.H	Leoben	Holzindustrie	1890	Methanol (1230 to)	1	4,9	Mur
					Formaldehyd (660 to)	2		

Flfd.Nr.	Betrieb Name	Ort	Zweck des Betriebes	Kategorie Stoffmenge/Lager	Art des wassergefährdenden Stoffes	WGK	GSI	Gewässer
32	Philips Components Lebring Ges.m.b.H	Lebring-St.Margarethen	Elektronik	32	Flußsäure 75% (31,98 to)	1	2,6	Mur
					Ammoniumdichromat (0,05 to)	3		
33	OMV, Raffinerie Schwechat	Schwechat	Petrochemie	343500	R11 und R12	2	7,6	Schwechat
				1045	Methanol (902 to)	1		
					49 + 94 to T. Anmerkung: T = giftig	2		
				67000	R50 o. 50/53	2		
34	Reichhold Chemie Ges.m.b.H	Wien	Chemie	400	Phenol, Formaldehyd, Kresole, Xylenole	2	5,4	Donau
				1700	entzündliche und leicht entzündliche Flüssigkeiten	2		
				>200	umweltgefährliche Stoffe (Heizöl) ca. 200 to	2		
35	Schoeller-Bleckmann Edelstahlrohr AG	Ternitz	Metallindustrie	20	Flußsäure; Additionsregel	3	4,5	Schwarza/Leitha
				70	Kolenesalz, Bonder 72F, KMnO4; Additionsregel	2		
				25	Schmiers., Hydrauliköle, Petroleum;Additionsregel	2		
				150	HCl (Salzsäure), HNO3 (Salpetersäure), H2SO4 (Schwefelsäure) (130 to), Dowclene (20 to); Additionsregel	1		
36	Solutia Austria Ges. m.b.H	Werndorf	Chemie/Lacke	90	TDI (= Toluylendiisocyanat)	2	4,0	Mur
37	Sunpor Kunststoff Ges.m.b.H	St. Pölten	Kunststoffindustrie	75	Pentan - hochentzündlich gem. Seveso 2 Richtlinie	1	4,8	Traisen
				658	Methylstyrol (2,5 to), Styrol Monomer (655 to)	2		
38	Swarovski D&Co	Wattens	Glasindustrie	>50000	Mengenschwellen überschreitung Additionsregel	2	6,7	Inn
				42	Flusssäure (42 to)	1		
39	TBF Tanklager Betriebsführungsges.m.b.H	Linz	Tanklager	8300	Mitteldestillate (10.000 m3)	2	5,9	Donau

Flfd.Nr.	Betrieb Name	Ort	Zweck des Betriebes	Kategorie Stoffmenge/Lager	Art des wassergefährdenden Stoffes	WGK	GSI	Gewässer
40	Vantico	Wien	Chemie/Kunstharz	600	Kunstharze	2	4,8	Liesing/Schwechat
41	Wienstrom Ges.m.b.H	Wien	Energie	>200	Ammoniak (200 to)	2	4,3	Donau (kanal)
	Anmerkung:				**GSI insgesamt**		8,798	

Alle Betriebe mit Stoffen der Kategorien 2,3,4,5,7,8 wurden in die Berechnung ohne spezifische Betrachtung der Einzelstoffe einbezogen; damit sind vereinzelt auch Stoffe mit Stoffzustand gasförmig, die diesen Kat. zuzuordnen waren, mitgerechnet

Kategorien mit WGK 0 wurden nicht aufgenommen

Kategorien 1 und 6 nicht relevant

*) km bis zum grenzüberschreitenden Gewässer

**) Bei Furtenbach, ILC und Schöller-Bleckmann auch Donaugebiet betroffen (Leitha durch Ausleitungen beeinflußt)

Annex 5

Results of the ARS inventory of Bosnia in 2003

Bosnia and Herzegovina

Federation of Bosnia and Herzegovina

Watershed of the river Danube/ Coordinates of the Potential Accident Risks Spots

No.	Sub River Basin	Location	Source of Potential Accident Risks	Coordinates	
				X	Y
1.	River Una	Bihac	Oils tanks	5 573 500	4 961 600
	River Una	Pokoj	Oil tanks	5 570 400	4 967 700
2.	River Vrbas	Jajce	Ferro silicon factory	6 441 800	4 910 300
	River Vrbas	Jajce	Aluminums factory	6 443 600	4 911 200
	River Vrbas	Jajce	Old dump of track battery	6 443 800	4 911 700
3.	River Bosna	Vares	Old open iron mine, filled with atmospheric water	6 525 500	4 890 200
	River Bosnia	Breza	Oil tanks	6 521 000	4 873 000
	River Bosna	Blazuj	Oil tanks	6 520 600	4 856 500
	River Bosna	Lukavac	Chemical factory – caustic soda	6 550 100	4 931 700
	River Bosna	Tuzla	Salt mines / salt water reservoirs	6 553 400	4 934 200
	River Bosna	Lukavac	Coke factory / out of operation at present time	6 549 400	4 931 500
	River Bosna	Tuzla	Chemical factory / out of operation at present time	6 550 500	4 931 600
	River Bosna	Zivinice	Oil tanks	6 552 800	4 920 900
4.	River Drina	Vitkovici	Nitogen composition factory	6 578 300	4 832 100

Annex 6

Recommendation on Safety Requirements for Contaminated Sites in Flood Risk Areas

Final Draft

International Commission for the Protection of the Danube River (ICPDR)

APC (Accident Prevention and Control) Expert Group

Recommendation
Safety Requirements for Contaminated Sites in Flood-risk Areas

Elaborated by the ICPDR APC Expert Group

in the framework of the UNDP/GEF Danube Regional Project

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1 Introduction

Sites contaminated as a result of industrial activities and former waste disposal operations represent a potential danger for the environment. This is especially true of sites contaminated by hazardous substances which could be mobilised and enter water bodies in the event of a flood. The dramatic floods in recent years at Elbe, Danube and Oder rivers have shown that the release of toxic substances from contaminated sites may cause significant harm to water bodies in Europe. A first survey of potentially contaminated sites in the Danube catchment, initiated by the ICPDR, has shown the relevance of this problem for the Danube river basin and has emphasized the need for further action. For this reason the ICPDR decided to work out safety requirements for contaminated sites located in flood-risk areas in order to improve the safety level of those sites.

Beyond the scope of these requirements the ICPDR wishes to draw attention to the relevance of the precautionary principle: Countries should establish the policy framework and take the measures necessary to prevent any future contamination of sites in areas prone to flooding.

2 Purpose of the Recommendation

The Recommendation serves as a basic guideline for mitigating potential harmful impacts due to flooding of contaminated sites. The Recommendation describes the basic requirements for technical and organisational measures to improve the safety level of contaminated sites which could pose a hazard to water in case of flooding.

3 Definitions

Sites suspected of being contaminated:

These are sites suspected of having harmful impacts on soil, soil functions or water which may lead to risks or significant harm to human health and the environment. Sites suspected of being contaminated comprise:

- Closed-down waste disposal installations (former waste disposal sites) and other sites, at which wastes have been treated, stored or disposed of in the past, and

- closed down industrial installations (former industrial sites) and other sites, at which environmentally hazardous substances have been handled

which could cause hazards to human health and the environment.

Contaminated sites:
Contaminated sites are suspect sites which have been confirmed as being contaminated and /or subject to harmful soil changes.

Highly contaminated zones (hot spots):
Hazardous substances at contaminated sites are not usually distributed evenly across the whole site, but are concentrated at locations where the chemicals were handled or stored.

4 Scope of application

The Recommendation applies to all contaminated sites which are prone to flooding and contaminated by substances hazardous to water. The case of flooding includes, besides flooding,

- backflow from water bodies or sewer systems or
- a rise of the groundwater table as a result of long-term flood events.

The following sites are covered by the scope of the Recommendation:

- Sites suspected to have high potential for posing a hazard to water,
- sites contaminated as a result of former industrial activities and former waste disposal operations, and
- closed-down plants and plant components containing water endangering substances,

which are not effectively secured and might present a hazard to water in case of flooding.

Radioactively contaminated sites do not fall within the scope of these requirements, nor do sites presenting a potential hazard due to genetically modified organisms.

Facilities covered by this Recommendation include, for example:

- Underground installations which have not been emptied and/or removed
- Surface facilities
- Above-ground storage systems within buildings
- Components of closed-down plants
- Former waste disposal sites

5 Safety requirements

5.1 General requirements

1. Contaminated sites should be recorded in an appropriate database (e.g. land registry).
2. In general the "Polluter Pays Principle" should be applied
   - in investigations necessary to determine the contamination situation of sites suspected of being contaminated and further necessary measures and
   - when formulating proposals for remedial actions and in their implementation.
3. The financing of investigations and remediation should be ensured, e.g. through national agreements or funds, especially in cases where the polluter cannot be held liable.
4. Authorities should be enabled
   - to carry out the monitoring of contaminated sites and sites suspected of being contaminated,
   - to order monitoring measures and/or remedial measures
5. Enabled authorities are responsible for ensuring that identified suspect sites are investigated and, if necessary, remedial measures are implemented.

5.2 Requirements of risk estimation

1. All abandoned industrial and waste disposal sites located in flood-risk areas are suspected of being hazardous to water bodies in case of flooding. The following measures should be carried out in an initial survey to determine whether suspect sites are hazardous or non hazardous to water in case of flooding:
   - Initial estimation of the risk by classifying the water endangering potential of the former use (type of industrial branch or type of waste disposed of).
   - Priorisation of suspect sites according to the estimated water endangering potential.
   - Estimation of the flood risk at the site.

   Sites for which a safety risk has been identified should be investigated in more detail. A first proposal for immediate measures should be formulated if there are obvious safety risks.

2. Further investigations serve to generate additional information for a more precise characterisation of the hazard situation of the investigated site.

This information should cover the following points
- a description of the contamination situation,
- the determination of any assets that would be endangered in case of flooding, and
- a proposal for further measures to enhance the safety of the site, if necessary.

3. Based on detailed investigations and the identification of highly contaminated zones a list of measures should be drawn up to serve as a basis for the selection of specific remedial measures.

5.3 Technical requirements

5.3.1 Preventive measures

Preventive measures include inter alia:
- Controlling the stability and necessary static design and capacity of dams,
- Regular supervision and control of sites with a high risk potential,
- Increasing the retention time through:
  - storage basins for heavy rainfall and snowmelt water
  - building of reservoirs
  - renaturation and/or protection of floodplain forests
- Construction of dams at sites with a high flood risk.

5.3.2 Requirements for the remediation of contaminated sites

Different decontamination methods are available for contaminated sites in flood-risk areas:
- removal of soil and disposal in safe landfills,
- removal of barrels and tanks, or
- decontamination by chemical, physical or biological methods

In addition to conventional decontamination measures, containment measures, designed to permanently prevent the spread of pollutants, can be considered. Such measures include for example:
- Encapsulating of contaminated bodies of soil
- Sealing of surfaces.

Investigations should be performed to select the optimal treatment for each site.

If immediate action is necessary because human health is threatened, appropriate protective or restrictive measures should be carried out(e.g. restriction of access).

Annex 7

Draft Check Lists for the Investigation and Risk Assessment of Contaminated Sites in Flood Risk Areas

4th Draft

International Commission for the protection of the Danube River (ICPDR)

APC (Accident, Prevention and Control) – Expert Group

Checklist

for the
Investigation and Risk Assessment of Contaminated Sites in Flood Risk Areas

elaborated by the ICPDR-APC-EG

within the UNDP/GEF-Danube Regional Project

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Checklists for the investigation and assessment of CS in flood risk areas

1 Purpose and principles of the checklists

These checklists will serve as a hand guide for a first visit in properties, which are containing suspected sites to be contaminated by substances being hazardous to water. Within a staged processing the checklists aim at a pre assessment of the risk potential in properties and a first investigating visit to evaluate suspected contaminated sites and to complete the data base for those sites.

The purpose of this first site visit is to find out:

- whether immediate action is needed
- whether and where further investigations or measures should be taken
- where highly contaminated zones are suspected/confirmed

The data collected in the checklists should deliver the basis to assess if further steps are necessary to enhance the safety level of contaminated sites in flood risk areas. It includes the following information:

- Hydrological data to estimate whether the investigated site is really endangered by flooding (flooding potential)
- General data, which should give information about location, extension type, ownership structure of the site and about any precedent investigations
- An evaluation of the hazard situation answering the following questions:
  - Is there an indication of potential hazards at the site?
  - Is the site assessment with regard to the site's risk potential completed or is it necessary to record further data?
  - Which additional information is already available and could be used for the assessment?
  - Is an assessment possible or is a further data record or investigation necessary?

Examples are given for remedial actions and measures for a sustainable solution of the contamination situation and to protect water from impact of the polluted site. They will help the conductor

- To complete the data for a risk assessment and
- To indicate solutions for the investigated site.

Definitions for the specific terms used in this document are given in the following chapter.

2 Definitions

Properties

Land, which was formerly used by industry, military or agriculture and is mostly consisting of several sites of different use. As a result of the use properties can include contaminated sites.

Sites

A site is a part of a property, which is specified by its location and its former specific use over the years. Therefore different sites in one property could also vary in their condition, because of their miscellaneous types of use. In consequence of the use sites were contaminated by improper handling of hazardous substances.

Sites suspected of being contaminated (suspected contaminated sites)

These are sites suspected of having harmful impacts on soil, soil functions or water which may lead to risks or significant harm to human health and the environment. Sites suspected of being contaminated comprise

- Closed-down waste disposal installations (former waste disposal sites) and other sites, at which wastes have been treated, stored or disposed of in the past, and
- closed down industrial installations (former industrial sites) and other sites, at which environmentally hazardous substances have been handled,

which could cause hazards to human health and the environment.

Contaminated sites:

Contaminated sites are suspect sites which have been confirmed as being contaminated and /or subject to harmful soil changes.

Highly contaminated zones (hot spots):

Hazardous substances at contaminated sites are not usually distributed evenly across the whole site, but are concentrated at locations where the chemicals were handled or stored.

3 Scope of application

The checklists apply to all properties containing suspected contaminated sites in flood risk areas. The case of flooding includes, besides flooding,

- backflow from water bodies or sewer systems or
- a rise of the groundwater table as a result of long-term flood events.

The following sites are covered by the scope of the checklist:

- Sites suspected to have high potential for posing a hazard to water,
- sites contaminated as a result of former industrial activities and former waste disposal operations, and
- closed-down plants and plant components containing water endangering substances,

which are not effectively secured and might present a hazard to water in case of flooding.

Radioactively contaminated sites do not fall within the scope of this checklist, nor do sites presenting a potential hazard due to genetically modified organisms.

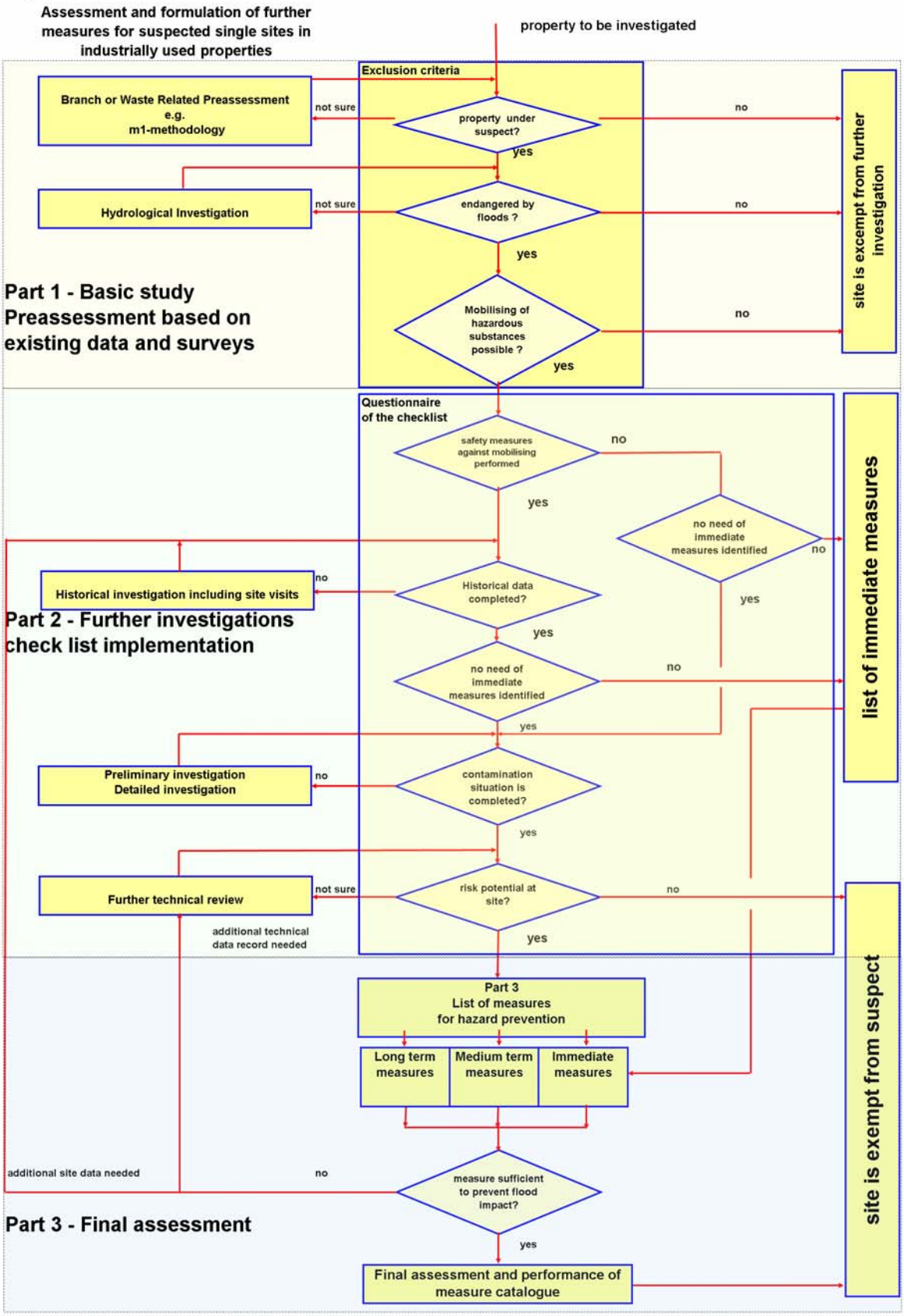
Facilities covered by this checklist include, for example:

- Underground installations
- Surface facilities
- Above-ground storage systems within buildings
- Components of closed-down plants
- Former waste disposal sites

The proceeding of the checklists is based on the idea that hot spots have to be identified in contaminated sites, which could abound in a property. An exemplary structure in figure 2 shows, how the terms property, site and hot spots have to be understood.

Although the checklists are designed primarily to assess the risk potential for water bodies arising from properties in flood risk areas, the checklists give also information about the danger potential to other goods to be protected. Even if investigated sites are exempt from further investigation within this scope (like shown in figure 1), they could contain anyhow a risk for other goods, which has to be investigated within the conventional past contamination treatment.

Figure 1:


Assessment and formulation of further measures for suspected single sites in industrially used properties
property to be investigated
Exclusion criteria
Branch or Waste Related Preassessment e.g. m1-methodology
not sure
property under suspect?
no
yes
site is excempt from further investigation
Hydrological Investigation
not sure
endangered by floods ?
no
yes
Mobilising of hazardous substances possible ?
no
yes
Part 1 - Basic study Preassessment based on existing data and surveys
Questionnaire of the checklist
safety measures against mobilising performed
no
yes
no need of immediate measures identified
no
yes
list of immediate measures
Historical investigation including site visits
no
Historical data completed?
yes
Part 2 - Further investigations check list implementation
no need of immediate measures identified
no
yes
Preliminary investigation Detailed investigation
no
contamination situation is completed?
yes
Further technical review
not sure
risk potential at site?
no
additional technical data record needed
yes
Part 3 List of measures for hazard prevention
Long term measures
Medium term measures
Immediate measures
additional site data needed
no
measure sufficient to prevent flood impact?
yes
Part 3 - Final assessment
Final assessment and performance of measure catalogue
site is exempt from suspect

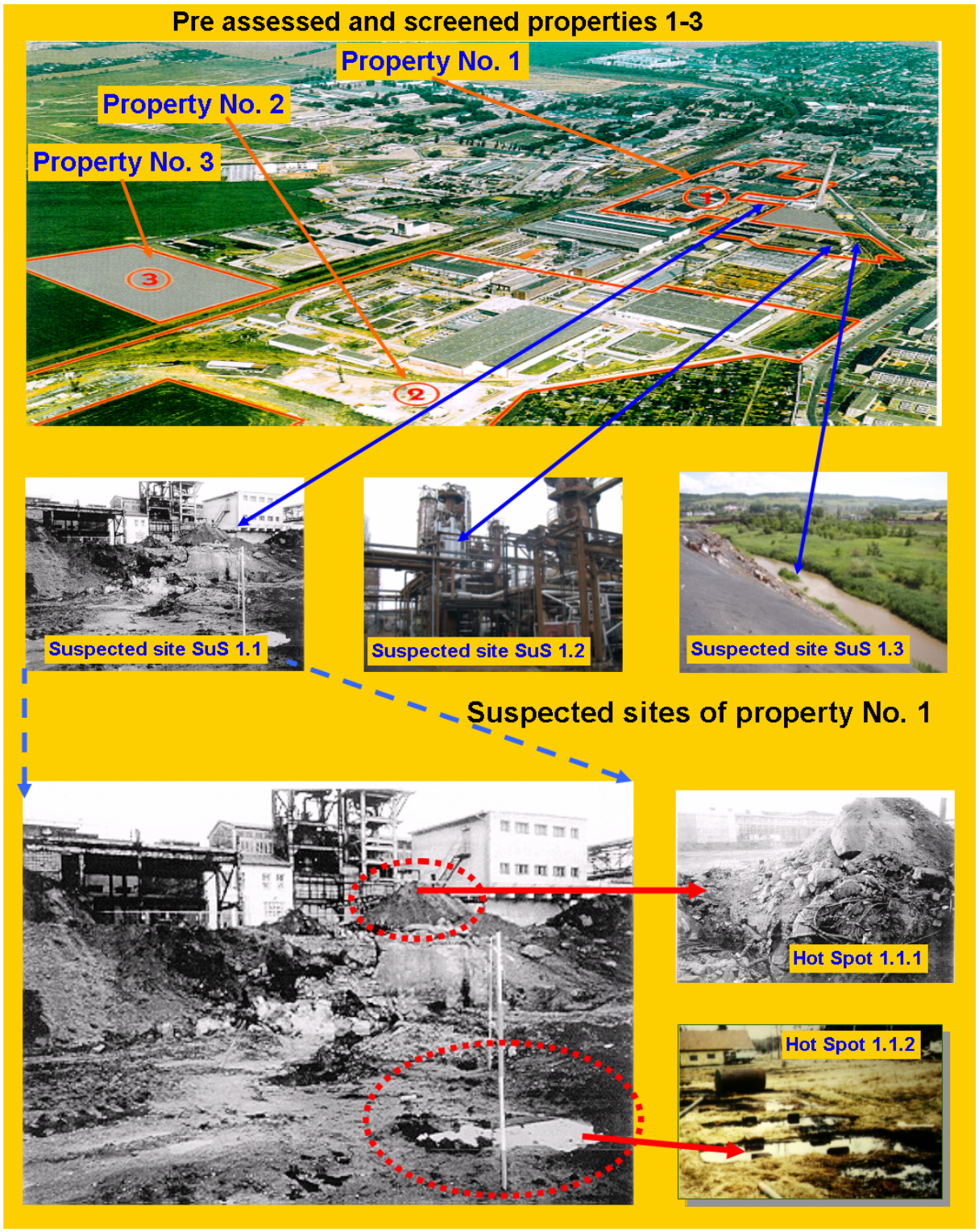


Figure 2: Illustration of the an exemplary property including suspected contaminated sites and hot spots

4 Description of the procedure

The checklist consists of three parts which include the following templates

- Part 1- Basic study (desk study) – Pre-assessment of the property, which is containing suspected contaminated sites
- Part 2 - Further investigations of suspected contaminated sites for visits and assessment. (separated in different checklists for abandoned industrial installations, uncontrolled waste disposals, waste water treatments and sites of presumed former incidents and hazards.)
- Part 3 - List of measures for prevention of hazard caused by flood events. (Findings and conclusions based on the collected data)

Figure 1 describes the procedure of the risk assessment to be performed for the suspected contaminated sites. It is divided into the following three parts:

- Basic study (see chapter 5)
- Further investigation and assessment (Check list implementation) (see chapter 6)
- List of measures (see chapter 7)

4.1 Basic study:

The basic study is a precondition for the check list implementation indicating, if a property is under suspicion to include potentially contaminated sites like shown in figure 2, which have to be investigated further. If further investigation becomes necessary, the sites will be visited and historically recorded by specific checklists, which include the questionnaire about former specific land use and its possible resulting contamination.

The basic study includes

- Compilation of fundamental data
- Pre assessment of the hazard potential at the property
- Estimation of the flooding potential
- Estimation of the mobility potential of the polluted volume
- Ranking of the property

The fundamental data should serve as a data base for the responsible authority or operator to indicate if further site investigations are needed for a special property. Depending on the available data, an estimation of the information level has to be made to identify the needs of further investigation.

The objective of the pre-assessment is to find out, if there is a reasonable suspect of hazard potential in case of flooding. For this assessment a screening of the property is needed, where the risk potential is very high. For this screening methodologies have to be used, which operate with different risk values. These risk values should be related to branch or waste specific toxic potentials. Depending on a threshold value for the risk, which is to be defined by the Danube Countries themselves, the properties should be screened and classified as hazardous and non hazardous to water in case of flooding[1].

The estimation of the flooding potential should give information, if the property is really endangered by floods. If not, there is no need of further site investigation with regard to risks caused by flooding (the site may still be hazardous for groundwater or other goods). If there is a flooding danger it has to be estimated, if there is also a danger of mobilising hazardous substances in case of a flood incident. In sum the properties will be assessed in form of priority values, which help to prioritise the properties with regard to their toxic potential and their potential to discharge hazardous substances into surface water.
If the basic study indicates a flood risk and a potential mobility of hazardous substances, further investigations are necessary.
As far as obvious needs of measures can already be identified, a preliminary list of immediate measures should be elaborated. (Measures could be e.g. immediate visiting of the site, prevention measures like proscription of site entrance).

[1] In an exemplary screening of sites in the Danube river basin the m1-methodology was used, where the toxic potentials of the sites were estimated on the basis of concretised practical experience (see appendices 1 and 2). The exemplary methodology is described in appendix 3. The risk values in this methodology ranged between 0 and 55. All sites with a value higher than 35 were classified to be hazardous.

The screened properties should be ranked at this assessment stage

- at first with regard to the determined risk value
- secondly with regard to the need of further investigation or of elaboration of immediate measures (which has to be defined by the authorities) and
- thirdly with regard to the size of the investigated property

4.2 Further site investigations:

The need of further investigations or of immediate measures at the site should be identified through site visits combined with the application of the checklist questionnaire shown in figure 1. The questionnaire of the checklist will answer the following questions:

- Are available data about the site is completed?
- Is the need of immediate measures identified?
- Is it possible to describe the contamination situation?
- Is the risk of the site definitely confirmed?
- Which measures have to be done next?

Besides to the necessary immediate measures further investigations are mostly identified to close the information gap about the investigated sites. These further investigations consist of the following stages:

- Historical investigation combined with site visits
- Preliminary investigations
- Detailed investigations

The checklist questionnaires will only consider the first steps of the historical investigation. Contaminated sites in flood risk areas have to be investigated predominantly with regard to the impact to surface water in case of a flood event. All other impacts are subjects for investigations in the field of conventional treatment of contaminations.

In the checklists the actual risk of an investigated site will be assessed on the basis of calculated water risk indices, which are based on estimated amounts of water hazardous substances with regard to their water risk class.

Any more detailed information has to be elaborated separately by performance of the investigation stages. As the checklist constantly refers to these investigation steps, they are described in the following.

1 Stage – Historical investigation combined with site visits

The historical investigation is aiming at a completion of all aspects of former industrial use in a site, which could cause hazard to water or soil in case of flooding. It helps to narrow the range of possible hazardous substances to be investigated. In this step all available information about the former use is searched and analysed, to get as much information about the site and possible hints about contamination. Information is found in archives, old manufacturing and construction files, documents of authorities etc. Interviews with former employees, neighbours, mayors are also a valuable source of information. The aim of this step is to determine possible pathways or hot spots for spreading of contaminants and possible impacts on water, soil and air and to exclude irrelevant impacts.

The gathered data arising from historical investigation has to be verified and concretised by a site visit, which should be recorded in a checklist. The objective of this check list is to gather all identified suspicious facts, which gives information about needs of immediate measures/actions and further investigation steps relevant for the enhancement of the safety level at site.
If in the first step no need of immediate action is identified, but the site can not be exempt from suspect to be hazardous, a preliminary investigation is necessary in the second step.

2. Stage Preliminary investigation

The objective of the preliminary investigation is to assess the hazard for the relevant pathways and protected objects under impact, determined during the historical investigation. The assessment is based on analyses of the harmful substances distribution, data about the possibilities for their migration in case of flooding, as well as the prognosis about their load in the protected objects (means water body) under impact. If in the second step no need of immediate action is identified, but the site can not be exempt from suspect to be hazardous, a detailed investigation is necessary in the third step.

3. Stage - Detailed investigation

The objectives of the detailed investigation are:

- Final hazard assessment for the particular suspected contamination case (the suspected case is either dropped out, or accepted as a past contamination case)
- Setting of criteria for further treatment (e.g. parameters for monitoring or preliminary remediation objectives for the remediation investigation. Therefore a proposal for medium and long term safety measures and action for hazard prevention has to be elaborated in the fourth step. The concretion of these measures should be based by well founded reviews or analysis.

4.3 Assessment and list of safety measures

Based on these findings the sites can be prioritised and a list of safety measures can be proposed which include

- Immediate measures to enhance the safety level
- Preparatory measures to complete data, which are necessary to concretise safety measures for the investigated site.
- Prevention measures to mitigate the impacts of flood events in contaminated sites
- Remedy measures aiming at
  - elimination or reduction of pollutants *(decontamination measures)*,
  - Prevention or reduction of pollutants spreading in a lasting way, without eliminating the pollutants themselves *(Securing containment measures) or*
  - elimination or reduction of harmful changes in soil's physical, chemical or biological characteristics
- Protection and Restriction measures, aiming at a prevention or reduction of hazard impact for health and environment, especially usage restrictions.

Examples for short, medium and long term measures are listed in the following.

Short-term measures:

Preparatory measures

- *Preliminary investigation has to be started, if the risk potential is not well known*
- *In case of further hazard suspicion a detailed investigation has to be started, if the contamination situation is still not completely identified*
- *A hydro geological survey should be started, if the risk of flooding is not quantified sufficiently*
- *A concept for active remediation or safety measures must be elaborated for a cost prognosis and for the elaboration of cost variants*
- *Steady Supervision or monitoring of the sites with regard to stability and dimension of the safety dams are necessary.*

Safety measures

- *Protection and restriction measures such as:*
  - *Danger sign for contaminated area*
  - *Closure of the contaminated area*
- *Excavation and disposal of small volumes of contaminated soil (hot spots)*
- *Sealing of surfaces (suitable for heavy metal contamination)*
- *Capsulation of contaminated volume (suitable for mixed contaminants)*

Medium-term measures:

Preparatory measures

- *Conception for excavation and treatment of contaminated volume for example by washing (heavy metals or persistent substances) or by bioremediation (organic substances)*
- *Conception of evasion area for floods*
- *Conception of optimizing the dimensions of the river dams*
- *Concept for relocation of large deposits*

Safety measures

- *Bioremediation of medium sized oil contaminated area*
- *Stabilising of river dams*
- *Installation/optimisation of alarm systems*

Long-term measures:

- *Relocation of the deposits*
- *Securing measures for strong rain events*
- *Securing for large amounts of melting snow*
- *Adaptation of the river bed or the river dam*
- *Rain water storage basins*
- *Recultivation of flood plains*

5 Part 1- Basic study (desk study) Preassessment of the property suspected of being contaminated

5.1 Basic Data about the Investigated Property

The basic data should give the following information about the investigated property which may consist of several suspected sites:

- General data
- History of the property use
- Location description
- Status of the property

5.1.1 General data

The following questionnaire is aiming at a completion of the general data base to give conductors the necessary sufficient data framework for further investigations and to show the state of the present information level.

Notation of the property/ No.: _____

Timeframe of the visits: first visit:_____last visit:_____

Federal State _____

County _____

Township/district _____

Address Postcode: Street and street number:_____

Location ❑ inside locality ❑ outside locality ❑ marginal area

specified:_____

Is there a general information available?

❒ Yes ❒ No,

if no, the data have to be collected

if yes, please specify

Property size _____[ha]

Contact person (authority)_____

Telephone _____

Telefax _____

E-Mail _____

Responsible Processor _____

Contact person (authority)_____

Telephone _____

Telefax _____

E-Mail _____

Cadastral number _____

Coordinates _____

Further sources of information should be listed according to Table 1:

Source	Name	Contact person	Address/ Telephone
authorities			
Enterprise			
Institute			
Contemporary Witness			

Table 1: List of further sources of information

5.1.2 History of the property use

The listing of the former use of the property should give information and indicators for possible contamination. If the use is only supposed but not confirmed, a historical investigation can help to prove the suspicion. The former use should be listed as shown in Table 2

Time frame	Former use	presumed	confirmed	Probable contamination
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	
		❒	❒	

Table 2: List of former use of the site

5.1.3 Description of the location

The description gives information, in which area the property is located and which sensitive bordering area could be harmed.Table 3 gives an overview of the possible areas

Area	bordering	inside
Industrial area	❒	❒
Mixed-use zone	❒	❒
Residential area	❒	❒
Hospital	❒	❒
Nature protection area	❒	❒
Landscape conservation area	❒	❒
Recreation area	❒	❒
Agriculturally used area	❒	❒
Forest area	❒	❒
Drinking water protection zone	❒	❒
Standing water body	❒	❒
Body of flowing water	❒	❒

Table 3: Compilation of sensitive bordering areas

Additional information (special remarks to the site condition): _____
_____
_____

5.1.4 Status of the property

This questionnaire gives conductors information about the present situation of the property and the present activities at site aiming at the completion of relevant investigation and safety activities.

Is there any information about the ownership structure and the responsibility for the property available?

❒ Yes ❒ No

If the ownership structure or Status of enterprise is not known, a historical investigation has to be started. Contemporary witness must be found.

If yes, is the status of enterprise known

❒ Yes ❒ No

If no, further data record on cadastral register has to follow
If yes,

Status	yes	no
closed		
With formal document		
Operating		
With permit		
Listed for control		
No administrative act before		

Has the site already been investigated with regard to the hazard potential?

❒ Yes ❒ No

if no go to 5.2
if yes, which investigation

- ❒ Initial risk assessment
- ❒ Historical investigation
- ❒ Preliminary investigation
- ❒ Detailed investigation

Was the suspicion of contamination confirmed?

❒ Yes ❒ No

if no, further investigation must be started if there is still a strong suspicion of contamination. If there is no strong suspicion the sites should be handled in the framework of the regular handling of contaminated sites.

If yes, were contaminated area(s) identified?

❒ Yes ❒ No

if no, the detailed investigation must be started. If the detailed investigation shows no further suspicion, the sites should be handled in the framework of the regular handling of contaminated sites.

if yes, were remedy measures already taken to prevent hazards in case of flooding?

❒ Yes ❒ No

if no, plan for remedy action should be started

If yes, which measures?

Identification of measures

If there is already an impact to surface water then perform

Removal of contaminants

- ❒ Excavation of contaminated soil
- ❒ Relocation and disposal of waste
- ❒ Relocation and intermediate storage of waste
- ❒ Drainage and intermediate storage of leachates

If not, but an impact to surface water is already expected

Remediation/decontamination of contaminated sectors

- ❒ Bioremediation
- ❒ Soil washing
- ❒ Thermal treatment
- ❒ Leachate drainage and treatment

If a direct impact to surface water is not expected but in case of a flood eventp, the following measures could be also performed:

Protective and restrictive measures

- ❒ Sealing of surface
- ❒ Encapsulating of contaminated volume
- ❒ Building of safety dams
- ❒ Restoration of safety dams
- ❒ Monitoring and Control
- ❒ Restricted use of the property
- ❒ Prohibition to access
- ❒ Closure of the property

5.1.5 Estimation of the information level

Based on the gathered data, the information level is

- ❑ 1 – Very low
- ❑ 2 – Low
- ❑ 3 – Medium
- ❑ 4 – Sufficient
- ❑ 5 – High

For the decision making, please consider the following table. The Table 4has to be understood as a clue for a rough classification of the information level about the property

Priority regarding information level	Information level	Initial assessment	Historical investigation	Property visit	First list of immediate measures	List is proved and confirmed	Preliminary investigation	Preliminary risk assessment confirmed	Detailed investigation	Detailed risk assessment confirmed	Proposal of remedy measures	Remediation proposal confirmed
1	very low	**+**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
2	low	**+**	**+**	**+**								
3	medium	**+**	**+**	**+**	**+**	**+**						
4	sufficient	**+**	**+**	**+**	**+**	**+**	**+**	**(+)**	**(+)**	**(+)**		
5	high	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**

+ applicable

(+) limited applicable in case of further investigation needs

Table 4: Proposal for classification of the information level

5.2 Preassessment of the hazard potential of the contaminants

To assess the hazard potential the dimension of the contamination (in m² or m³) and the substance, the type of waste itself or the industrial sector have to be known. Based on this data an estimation of a risk value could be done, like it is exemplarily done in the m1-methodology.

5.2.1 Dimension of the contamination

❒ known ❒ estimated ❒ not known

Area _____sqm

Contaminated volume _____ m³

5.2.2 Substance/contaminant

❒ known ❒ estimated ❒ not known

Specified:_____

5.2.3 Industrial branch classification code

This question should help to find out, which present and former industrial use is known in this area. It should be specified by the industrial branch specification code exemplarily shown in annex 1 (Please list codes, if there is a relationship with one or more industrial branches)

_____

_____

Resulting Risk class according to the branch related risk value in chapter 10:

Risk Value according to (e.g. M1-methodology):

5.2.4 Waste Codes (according to European Waste Catalogue)

This question should help to find out, which waste was accumulated during the industrial processes or which waste was or even is actually disposed at the site. It should be specified by the waste codes according the European waste catalogue shown in annex 2 in a table like shown beneath.

Waste code	waste type	amount (Mg)	Probable risk class	Proportion in %

Table 5: List of the accumulated, handled or disposed waste at the site

Resulting Risk class according to the waste related risk value in chapter 9:

Risk Value according to (e.g. M1-methodology):

5.2.5 Results of the hazard potential pre assessment - Determination of the risk value

For the screening of those properties, which might include sites probably contaminated with hazardous substances, the determined risk values have to be compared with a threshold value, which should be defined by the authorities themselves. Also the classification, which risk values are considered to be significantly higher than to the threshold value can be fixed[3] by the authorities.

The urgency for safety measures on a property is depending on the defined priority value, which should be classified according to the ratio between risk value and threshold value as described in Table 6.

Priority value regarding impact of the substance	**Risk**	**Risk value compared to threshold value is**			
		Significant higher	higher	lower	Significant lower
1	Low				✓
2	Medium			✓	(✓)
3	High	✓	✓		
4	Very high	(✓)			

✓ Applicable (✓) Applicable if estimation is confirmed by survey

Table 6: Proposal fort he classification of the priority values regarding the substantial hazard

The suspicion of risk is confirmed, if one of the resulting risk values is higher than the defined threshold values. If both risk values are lower than the defined threshold values, a further investigation of the property is still necessary, if the suspicion of contamination can not be totally excluded by surveys.

The result of this risk estimation is to be fixed in Table 7

Result of the assessment	**Branch related risk r_B**	**Waste related risk r_W**
Resulting risk value:		
Threshold risk value r_T:		
Priority with regard to the impact of the substance		

Table 7: Result of the substantial risk estimation

Short term measures:

- *If there is no information given, assess the actual hazard potential by searching indications for former industrial use.*
- *If indications of contamination are given, perform a historical investigation to concretise the contamination potential.*
- *Perform a first visit of the property using part II and III of the checklist.*

[3] (E.g. threshold value is 50 percent of the maximum risk value and the risk is considered very high, if the risk value is 30 percent higher than the threshold value).

5.3 Estimation of the flooding potential

The objective of this questionnaire is to find out, if there is a reasonable suspicion of a risk of flooding. If a risk of flooding is confirmed for a property containing hazardous substances, it has to be investigated further if the contaminants can be mobilized by flooding.

How often is a flood expected?

❒ Decennial ❒ Every thirty years ❒ Every hundred years

How did a flood occur?	Yes	No	Not sure
High water			
Back pressure from bodies of water or canals			
Rising groundwater levels as a result of extended periods of high water			
Which data confirmed the danger of flooding ?	Yes	No	Not sure
Monitoring data			
Hydrological surveys			
contemporary witness			
Other reports			
Is the whole property endangered by flooding or only parts??	Yes	No	Not sure
Whole site			
Parts, but close to contaminated zones			

Danger of flooding is

❒ very high ❒ high ❒ medium ❒ low

Resulting priority regarding flood-proneness:_____

For the decision making process please consider the Table 8 beneath:

Priority value regarding flood-proneness	**Flood-proneness**	**If probability of flooding in years is**				**Remarks**
		< 10	< 30	<100	>100	
0	Very low					If flood-proneness is very low, it has to be proved, if the site can be exempt from the investigation.
1	Low				✓	
2	Medium			✓		
3	High		✓			
4	Very high	✓				

Table 8: Proposal for the classification of the priority values regarding the flood-proneness

Short-term measures:

- *If no data is available a hydrological investigation has to be started to clarify, if a property is endangered to be flooded.(see also medium term measures)*

Medium and long term measures:

- *If the property is in a flood risk area, it has to be investigated if measures for the enhancement of safety level in the suspected property are necessary. If yes, they must be planned and realised, e.g. stabilisation of old dams or building of new dams.*

5.4 Estimation of the mobility potential of the contaminant

The objective of this questionnaire is to find out, if the contaminant or the contaminated soil are mobile in case of flooding. If a danger arising from this mobility has to be expected, safety measures should be considered to lower the risk. If a high danger resulting from the mobility is confirmed for a property, which contains hazardous substances and the flood risk is also high a further investigation of the property and measures should follow.

Information is existing
❒ Yes ❒ No

If yes go to the next question
if no, the property sites should be visited or additional surveys should be started
(see also short term measures at the end of this chapter).

Where does the contaminant exist? (please fill in Table 9)

Hazardous substance	in	Not saved	Safety measures performed			
			Removal or clearance	Against uncontrolled dismantling	Retention basin or dam	Sealing
	❒ Landfill					
	❒ Leachate					
	❒ Dump or pit					
	❒ Tank farm above ground					
	❒ Tank farm under ground					
	❒ Storage basin					
	❒ Storehouse					
	❒ Barrels					
	❒ Bags					
	❒ others					
How is the potential of hazardous substances or contaminated soil volume to be mobilized in case of flooding (mobility potential)? ❒ very high ❒ high ❒ medium ❒ low ❒ very low						

Table 9: Compilation of relevant aspects for the assessment of the mobility potential

Table 9 should gives information about the present situation, where the contaminant is located. According to the data scheduled in this table the investigator can assess the mobility potential of the contaminant. The mobility potential could be assessed depending on the expected hazard impact and the performed safety

measures to prevent impacts. The assessment should be carried out according to the following table. (please see Table 10).

Potential of mobility depending on hazard impact and performed measures					
Expected hazard impact in case of flooding	**Safety measures performed**				
	Removal or clearance	**Against uncontrolled dismantling**	**Building of Retention basin or dam**	**Covering or sealing**	**No measures**
Human error	Very low	Low	Low	Very low	Medium
Shockwave	Very low	Medium	Low	Low or medium	Very high
Heavy rain events	Very low	low	Medium	Very low	High or Very high
High water	Very low	Very low	Low	Very low or low	Medium or high

Table 10: Proposal for the classification of the mobility potential

For the classification of the listed impact in view to the relevance for the investigated location, please consider the following remarks:

- Human error is mainly characterized through activities which lead to contaminants loss caused by improper locking or fixing of installations. (e.g. if a sludge treatment facility is not locked early enough since the flood occurs)
- Shockwave could cause significant destruction on dams, retention basins and installations or even a flush away of deposits or dumps, which will lead to a contaminant discharge if they are insufficiently saved. Shockwave appear predominantly in narrow valleys. Since the flood event occurred in the river Elbe the dimension for narrow valleys should be newly defined.
- Heavy rain events could cause an instability of constructions, which lead to a less function ability of safety installations (e.g. safety dams, groundings or retention basins).
- High water could cause a raising and destruction of underground storage facilities, an instability of constructions and a mobilizing of contaminants in unsaturated contaminated volume.

The danger arising from the emission of the contaminated volume, which is hazardous to water, in case of flooding depends on two factors: the mobility potential of the contaminated volume/contaminat and the solubility of the harmful substance. Therefore the solubility of the relevant contaminant also has to be considered in this assessment.

Solubility of the substances

❒ very high ❒ high ❒ medium ❒ low ❒ very low

Based on the estimation of the mobility potential and the solubility of the contaminants the danger of contaminants discharge should be determined. Table 11 shows a proposal to classify this danger with regard to these factors.

Solubility of the substances	**Very high**	**High**	**Medium**	**Low**	**Very low**
Mobility potential of the contaminated volume					
Very high	Very high	Very high	High	Medium	Low
High	Very high	High	Medium	Medium	Low
Medium	High	High	Medium	Low	Very low
Low	High	Medium	Medium	Low	Very low
Very low	Medium	Medium	Low	Low	Very low

Table 11: Proposal for the classification of the danger of contaminants discharge with regard to the mobility of the contaminated volume and the solubility of the contaminants

According to the determined danger the priority values are defined as follows:

Priority value regarding mobility of the contaminated volume and solubility of the contaminant	Danger from contaminant discharge	Estimated situation, please mark with a cross
0	Very low	❒
1	Low	❒
2	Medium	❒
3	High	❒
4	Very high	❒

Short-term measures:

- *Is no conclusive data available, data research has to be started. Contact to meteorological network agencies is necessary*
- *If no data is available about the mobility potential of contaminants in case of flooding, a hydro-geological investigation has to be started, if the flooding potential is high or very high.*
- *To avoid impacts on human health abandoned installations have to be cleared and/or removed*
- *Prove the stability of dams and the dimension of retention basins (Wether they are sufficiently dimensioned and constructed for shock wave events or heavy rain events).*
- *Prove if mobilising of contaminants caused by high water could be avoided by sealing of contaminated volume or locking of installations*

Medium term measures

- *To avoid impacts on human health abandoned installations have to be sealed.*
- *Build sufficiently dimensioned dams and retention basins to mitigate the impact of shockwave and heavy rain events.*
- *To avoid the impact of shockwave remove installations and contaminated volume from the flood risk area*
- *If the investigation does not affirm an adequate dimensioning start to reconstruct old safety installations or build new safety installations*

5.5 Preliminary ranking of the property

The site is ranked according to the average of the afore mentioned priority values (substance, flooding potential, mobility)

$$A_P = \text{sum of priority value}/3$$

A_P = Average priority value

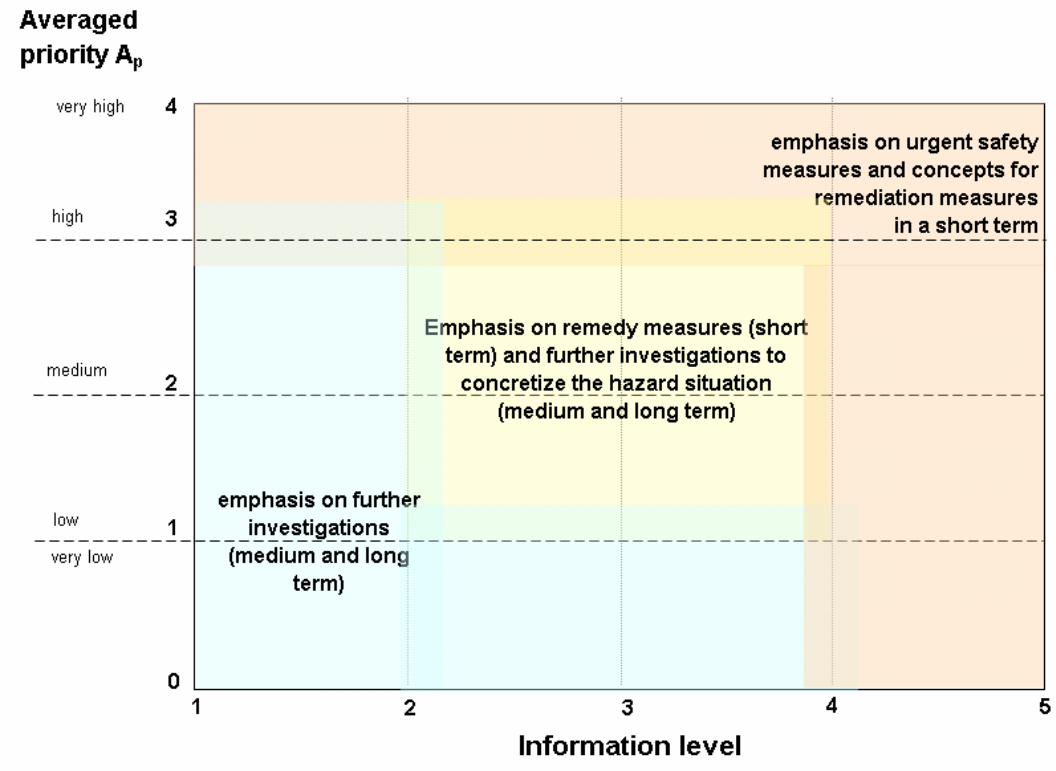
If two properties have the same A_P, the ranking is determined secondly by the information level. The higher the information level the higher the need for active safety or remedy measures. If the properties are ranked with regard to their risk potential and their need for urgent measures the property with low need of investigation are ranked higher than properties with higher need of investigation.

If the need of further investigation is also the same, the size of the property is determining in the third step (which site could be easier investigated/ remediate in a short time).

According to figure 2 the sites should be classified, if there is need for immediate measures and/or further investigation.

Immediate measures necessary	❒Yes	❒No
Remedial measures (short and medium term) necessary	❒Yes	❒No
Further investigation necessary	❒Yes	❒No

Figure 2:
Classification of the pre assessed property according to averaged priorities vs. information level



As shown in figure 2, the following requirements on measures result with regard to the information level:

- If priorities for mobility and risk of flooding are very high immediate measures to rise the safety level are necessary
- If the information level is lower than 2, there is a necessity for further investigation to affirm the estimated priorities for mobility and risk of flooding (especially if these potentials are very high or high, which would make immediate measures necessary)
- If the substance priority and mobility are very high, but flooding danger is very low, measures should depend on the results of further investigations. The same is valid if substance priority and flooding danger are very high and the mobility is very low.

The following immediate measures in case of identified risk of flooding should be taken into consideration:

- If the property is endangered by high water, stability and dimensions of dams have to be proved.
- All technical facilities in this property have to be proved with regard to safety requirements.
- If the property is endangered by back pressure, all safety facilities of the sewerage system have to be proved. (Impermeability, swing type check valve, storage tank for process water, rain storage reservoir etc.)
- In case of rising groundwater levels, stability of tank systems has to be proved and it has to be proved if rising groundwater is touching a relevant contamination hot spot, which leads to a contamination displacement.
- In case of rising groundwater levels and heavy rain events, stability of dams have to be proved with regard to the risk of being eroded.

In case of identified high mobility measures such as

- Excavation of contaminated volume
- Sealing of the surface

should be taken into consideration.

6 Part 2 - Further Investigations of Suspected Contaminated Sites in Properties

This form has to be completed for each suspected site inside of a property. It comprises

- Checklists for questionnaire and data compilation to classify the suspected site
- Assessment of the probable environmental impact of the suspected site in case of flooding
- Proposal for measures
- Summarized results and preliminary assessment of the site
- A photo documentation and description of each single site

All contaminated sites should be listed in specific checklists, where the estimated water risk class equivalents (according to risk class 3) are determined. At least in a summarized list, where all sites of one property are listed, the sum of the water risk equivalents and the water risk index WRI should be calculated, which give the information about the potential impact of the contamination to the surface water. This value gives no information about the actual risk, but it helps to prioritize the properties and the single sites. It helps to find out which of them need immediate measures most and which further investigations are necessary (e.g. how mobile are the contaminants in the polluted zone).

6.1 Front Page of the checklist for the suspected site investigation

Name of the property:	***model factory***
Site description	***production line for acryl nitrile***
Sequential number of the suspected site	***e.g. SuS 1.2***
Used Map	***Land register map 2003_11_03 1: 10.000***

A property can contain several sites with different former uses. Figure 3 shows an exemplary structure of the checklists. The checklists are built up to four different kind of suspected contamination.

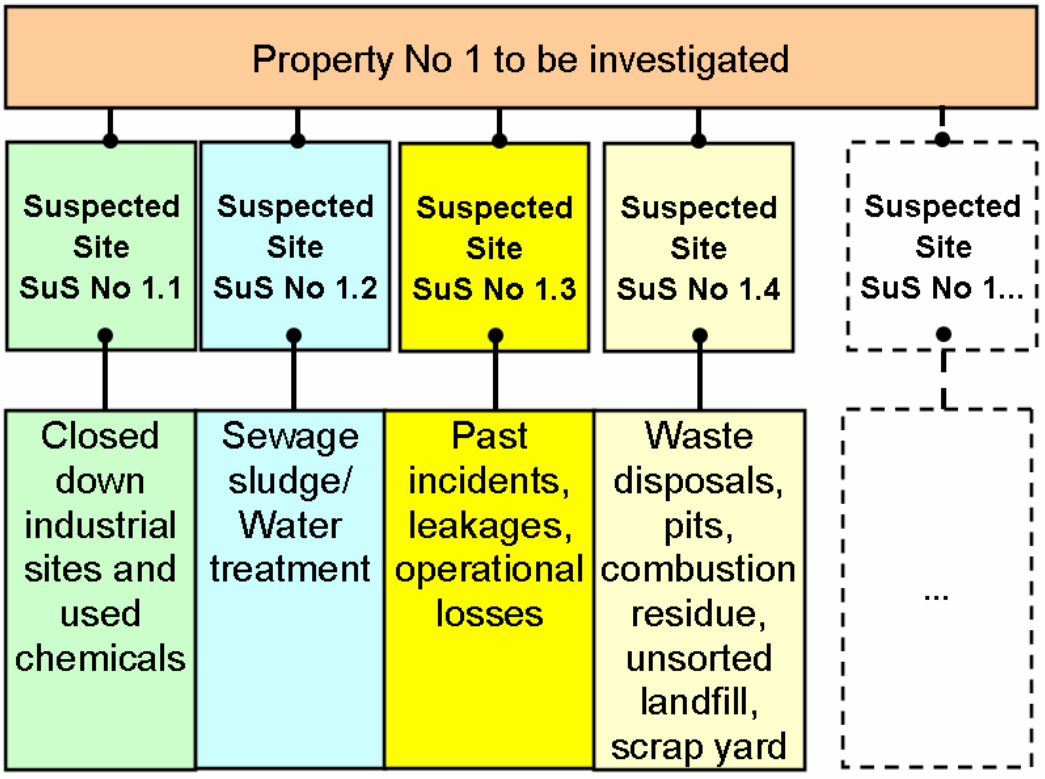


Figure 3: Exemplary structure of the checklists

Please mark with a cross the correct item for the special site in the property to be investigated. Multiple crossing is possible, if the site includes more than one of the items.

- ❒ ….[4].Closed down industrial installations (see further checklist chapter 6.2)
- ❒ Sewage sludge/ Water treatment (see further checklist chapter 6.3)
- ❒ Other sources of contamination, past incidents, leakages, operational losses (see further checklist chapter 6.4)
- ❒ Waste disposals, pits, combustion residue, unsorted landfill, scrap yard (see further checklist chapter 6.5)
- ❒ Summarized results and preliminary assessment of the site (see table 14 in chapter 6.6)

6.2 Hazard potential of closed-down plant facilities and used chemicals

This questionnaire should help to the specified hazard potential of closed down installations including operating supplies. It helps to concretise the need for immediate measures. For this property, all specified suspected sites where hazardous substances and chemicals seemed to be used during the industrial production have to be listed in a table.

6.2.1 Basic data

Name of the property:	***model factory***
Site description	***production line for acryl nitrile***
Sequential number of the suspected site	***e.g. SuS 1.1-01***
Used Map	e.g. ***Land register map 2003_09/02_01 1: 5:000***
Classification according branch catalogue	
Suspected Substance	
Water risk Class	

6.2.2 Questionnaire and data compilation

Short description of the installation:

[4] Number of closed down industrial installations

Were the installations already removed?

❒ Yes ❒ No

if yes go to 6.2.3

if no, please list the remaining installations in Table 12:

Identity Number	Quantity	installation	Volume in m³	Weight (approx.) t	Installation is built			Installation is			
					Above ground	underground	On water surface	emptied	saved against updrift	saved against leakage	sealed
SuS-1.01	5	***tank***	10		☒	❒	❒	☒	❒	☒	❒
					❒	❒	❒	❒	❒	❒	❒
					❒	❒	❒	❒	❒	❒	❒
					❒	❒	❒	❒	❒	❒	❒

Table 12: List of installations

6.2.3 Assessment of the probable environmental impact

Suspected/estimated amount of contaminants in the installations in kg _____

Water risk equivalent[5] of the residues in kg _____

Is the underground of the installation affected by pollution? (Proof according organoleptic test)

❒ Yes ❒ No ❒ not sure

if not sure, start a preliminary investigation by chemical analysis of the soil

if yes,
estimate the amount of contaminants in the polluted volume in m³ _____

Water risk classification according waste or branch catalogue _____

Water risk equivalent of the waste in kg _____

Sum of water risk equivalent in kg _____

[5] Related to the water risk class 3

6.2.4 Proposal for safety measures:

Examples of actions:

Short-term measures:

- *If vessels and pipelines are containing hazardous substances, emptying of vessels and pipeline and environmentally safe disposal of the content is necessary.*
- *After emptying the dismantling and removing of the plant facilities has to be completed*
- *If measures are already taken, prove if they are sufficient to avoid hazard incidents*
- *Concept for working safety must be considered*

The following measures are necessary if the underground vessel or pipeline can not be emptied, removed and is not sufficiently protected against uplifting:

- *Increase the coverage with earth, or*
- *install a concrete slab which covers the vessel, or*
- *Anchor with steel tapes which are secured to a concrete slab.*
- *Demonstrate that the protection against uplift is sufficient.*

The following measures are necessary if highly contaminated zones under the installations are suspected:

- *A preliminary investigation has to be carried out to verify if high contaminated zones do exist identified.*
- *A detailed investigation has to be started, if either the contamination dimension is not known exactly or the risk is not confidently excluded by preliminary investigation.*
- *If the further investigations reveal contamination and indicate a hazard for water, remedial measures are needed*

Medium term measures:

- *If site treatment is not feasible in the short time, monitoring of the site is necessary*
- *If the contamination dimension is known, but remedy measures were not taken so far, preparation of a remediation concept is needed with measures like*
  - excavation of tank and contaminated soil
  - sealing of the contaminated volume
  - bioremediation or disposal of contaminated soil
  - extraction of oily phases
- *In case of concreted contamination situation, remedial measures have to be chosen with regard to cost effectiveness and expected result to be achieved. The more mobile the contaminants are*
  - an excavation,
  - degradation or
  - removal
  of contaminants is preferable to other safety measures like sealing.
- *The conception of remedial measures should consider also natural attenuation processes*
- *Concept for working safety must be considered*

Long-term measures:

- *If sealing will be removed during future civil works, vessels and pipelines must be also removed.*
- *Concept for working safety must be considered*

6.3 Sewage sludge/Waste Water Treatment

6.3.1 Basic data

Name of the property: ***model factory***_____

Site description ***production line for acryl nitrile (Waste water treatment)***_

Sequential number of the suspected site ***e.g. SuS 1.1-02***_____

Used Map e.g. ***Land register map 2002_09/02_02 1: 5:000***

Comments: Investigation of the waste water treatment is only necessary, if the product of Pop. Equivalent 10^{WRC} > 100.000*

Treatment is existing ❒ yes ❒no

if **not go to 6.5**

WRC= Water risk class of the treated water contaminants: _____

Population equivalent of the waste water treatment: _____

Product: _____

If product is lower than 100.000 **go to 6.4**

If not, go to 6.3.2

6.3.2 Questionnaire and data compilation

Treatment condition

Treatment facility	**still in action**		**condition**			**sealed**	
	yes	no	good	bad	unpredictable	yes	no
Sewerage system							
Sewage plant							
Sump, dry well							

If treatment is still in action, is it protected against flooding?

❒ Yes ❒ No

If yes, how
❒ By dams
❒ treatment consists of closed tanks and vessels
❒ By retention basin
❒ Others, please specify _____

If no, how should it be protected
❒ By dams
❒ treatment consists of closed tanks and vessels
❒ By retention basin
❒ Others, please specify _____

Sewage sludge disposal

Sewage sludge is/ was disposed/treated
❒ at site ❒ out of the site

If at site, is the site protected against flooding?

❒ Yes ❒ No

If yes, how
❒ By dams
❒ treatment consists of closed tanks and vessels
❒ By retention basin
❒ Others, please specify _____

If no, how should it be protected
❒ By dams
❒ By retention basin
❒ Others, please specify _____

6.3.3 Assessment of the probable environmental impact

Volume of the disposed sludge: _____m³

Classification according waste catalogue _____

Calculated WRC3-equivalent: _____kg

6.3.4 Proposal for safety measures:

Short term measure:

- *If no water treatment is specified but there is still a suspicion of treated process water, look for disposed material within the industrial site*
- *If water treatment is specified and still in action, look for the residues coming up from the treatment.*
- *Prove safety of dams with regard to their stability and dimension according estimated tide.*
- *If water treatment is specified but not in action,*
  - look for the disposal of remaining residues in treatment facilities, storage or sedimentation tanks,
  - sealing of the outlet pipes is necessary.
- *If sewage sludge is treated and disposed at site, look for the safety and stability of the deposits in case of flooding and heavy rain events.*

If the waste water residues are high loaded with water hazardous substances the following measures could be relevant in medium and long term:

Medium term measure:

- *Elaboration of a safety concept for waste water treatment residues, disposed at site.*

Long term measure:

- *Excavation or sealing of the disposed residues.*

6.4 Past incidents, leakages, operational losses

6.4.1 Basic data

Name of the property:	***model factory***
Site description	***production line for acryl nitrile (Past incidents)***
Sequential number of the suspected site	***e.g. SuS 1.1-03***
Used Map	e.g. ***Land register map 2002_09/02_03 1: 5:000***
Classification according branch catalogue	
Suspected Substance	
Water risk Class	

6.4.2 Questionnaire and data compilation

In Table 13 former incidents at the suspected site should be listed. This table helps to identify hidden contaminated zones, which are suspected but still not confirmed by investigations. On that basis the need for further investigations will be formulated, which helps to substantiate the relevant risk areas. Indications for hidden contaminated zones could be former incidents, leakages or operational losses, which occurred at the site. Information about those incidents can be given from contemporary witness or a log of the enterprise are valuable source of .
The amount of the substance set free has to be estimated. With the given water risk class for the substance a water risk equivalent related to the water risk class 3 will be calculated as a size for the environmental impact to the water body. This equivalent is calculated with regard to a mobilization of the whole contaminated volume in case of flooding. It does not consider natural attenuation processes, which have taken place over the years and may have led to a decrease of the pollution.

Year	Local point.	Hazard incident			Contaminants and water risk class	Estimated amount in kg	WRC3-equiv.
		accident	leakage	operational loss			
1954	***Tank 01***	***x***			***Ammonia 2***	***10.000***	***1000***
1973	***Reactor03***		***x***		***Acrylnitril 3***	***10.000***	***10.000***
					Sum of WRC3		**11.000**

Table 13: Example for the listing of former incidents

How is the suspicion confirmed

- ❒ By contemporary witness
- ❒ By documents of the authorities
- ❒ By actual investigation
- ❒ Other sources, please specify _____

6.4.3 Proposal for safety measures (see also proposal at the end of this chapter):

Short term

Medium term

Short term measure at the office:

- *If Point 6.4.2 can not be answered but there is a reasonable suspicion, which has to be verified, further investigation is necessary.*
- *Proof of consistency of the elaborated information through site visits and interviews with contemporary witnesses.*

Short term measure at site:

- *It has to be checked, whether facilities are still existing and have to be emptied and/or removed. If yes remove all vessels, tank and pipes. Residues of the substances hazardous to water have to be disposed in an environmentally friendly way.*
- *It has to be proved, if soil under the removed facilities is affected by pollution, if yes, excavate and relocate contaminated volume. Excavated soil has to be disposed on safe landfills.*
- *If large areas of soil are contaminated, a concept for alternative remediation or safety measures is needed.*

Medium term measure at site:

- *If the suspicion is affirmed by historical investigation, further investigations should clarify the extension and risk of the contamination. If the results show a significant hazard potential a plan for remediation measures is needed.*
- *In case of large sites, a priority list of measures for several contamination hot spots has to be elaborated.*

6.5 Waste disposal sites

6.5.1 Basic data

Name of the property:	***model factory***
Site description	***production line for acryl nitrile (Waste disposal)***
Sequential number of the suspected site	***e.g. SuS 1.1-04***
Used Map	e.g. ***Land register map 2002_09/02_04 1: 5:000***
Kind of waste	
Classification according waste catalogue	
Suspected Substance	
Water risk Class	

The investigation of waste disposal sites includes also pits, combustion residue, unsorted landfill, scrap yards.

6.5.2 Questionnaire and data compilation

6.5.2.1 Kind of disposal

The kind of disposal gives an indication, if the hazard potential of the disposal is high or low in case of flooding.

Disposal was

❒ Regular ❒ Irregular

If regular, name and address of the liable operator _____

_____

Did further disposal out of this site operate?

❒ Yes ❒ No

If yes, which type of disposal?_____

Waste was disposed in

Landfills	❒	
Disordered deposit	❒	
Combustion residues	❒	
Communal deposits	❒	
Filling of pits	❒	
Tips	❒	
Tips at slope	❒	
Filling of depressions	❒	
Combination	❒	
Other	❒	please specify _____

6.5.2.2 Safety

Does a leachate collector system exist?

❒ Yes ❒ No

If yes, is the leachate treated

❒ Yes ❒ No

if no, list results of chemical analysis to prove, if treatment is necessary.

Is landfill body safe and/or stable against flood events?

❒ Yes ❒ No ❒ Unpredictable

If unpredictable a survey about the dam static must be made.
If no, dam stability must be enhanced.

Are safety systems like dams or landfill liner system provided?

❒ Yes ❒ No

If yes, which kind of:

❒ Dam ❒ Cover system ❒ Leachate collector system

❒ Liner system ❒ Other, please specify: _____

if no, which kind of measures are necessary

❒ Dam ❒ Cover system ❒ Leachate collector system

❒ Liner system ❒ Other, please specify: _____

Are safety systems demonstrable stable against flood events?

❒ Yes ❒ No

Periodical Control and monitoring of the landfill body is

❒ Done ❒ Not done

Periodical Control and monitoring of the safety systems are

❒ Done ❒ Not done

6.5.3 Assessment of the probable environmental impact

Estimated capacity of the disposed volume

No		❒
< 1.000	m³	❒
< 5.000	m³	❒
< 10.000	m³	❒
< 50.000	m³	❒
< 100.000	m³	❒
< 200.000	m³	❒
< 300.000	m³	❒
< 400.000	m³	❒
< 500.000	m³	❒
< 600.000	m³	❒
< 700.000	m³	❒
< 800.000	m³	❒
< 900.000	m³	❒
< 1.000.000	m³	❒
> 1.000.000	m³	❒

WRC of the disposed substances:

Calculated WRC3-equivalent: _____

Resulting WRI: _____

6.5.4 Proposal for safety measures:

Short term

Medium term

Short-term measures:

- *Irregular waste disposal sites should be displaced if one has to assume that the waste contains hazardous substances. The waste should be disposed in regular waste management facilities.*
- *If the capacity and/or safety are not known, further investigation is necessary*
- *If leachate is collected, its quality has to be analised to determinate the probable hazard potential*
- *If leachate is not treated, monitoring of the outlet with regard to hazard potential and elaboration of a list of immediate measures is necessary (e.g. conception of a retention basin or an urgent removal of the contaminated volume, if the volume is too big, a remediation concept has to be elaborated in medium term)*
- *If leachate treatment is existing, prove the stability and dimension of the installation in case of a flood event.*

Medium term measures:

- *The larger sites with significant hazard potential should be sealed and saved against heavy rain events and direct impact by floods. Therefore a concept has to be elaborated based on hydro-geological data.*
- *If the contaminated volume can not be removed a concept for a leachate treatment has to be elaborated. Depending on the leachate constituents the treatment has to include mechanical, chemical or biological process stages, which are designed to be stable against flood incidents or are located outside of the flood risk area.*
- *If the safety of the deposit can not be guaranteed a concept for a deposit displacement must be elaborated.*
- *Control and monitoring of safety systems with regard to dimension and stability of the deposit slope*

Long -term measures:

- *Realisation of a drainage and treatment of the leachate and surface water arising from the deposit.*
- *If the hazardous substances are at risk to be washed away, a concept has to be elaborated considering measures such as relocation or sealing/encapsulation with regard to their efficiency and cost effectiveness. The measures suited best, should then be implemented.*

6.6 Summarized results and preliminary assessment of the site

Name of the property:	***model factory***
Site description	***production line for acryl nitrile***
Sequential number of the suspected site	***e.g. SuS02***
Used Map	***Land register map 2003_11_03 1: 10.000***

Table 14 shows the data compilation of all investigated objects of one site, which were taken as a summary from the checklists in chapter 6.1 – 6.5.. The summarized results of the investigation give a complete overview about

- the estimated environmental situation,
- the estimated risk to water bodies in case of flooding and
- a list about necessary measures to enhance the safety of the site.

Investigated site	**Number**	**WRC3 [kg]**	**WRI**
SuS 02			
Past incidents, leakages, operational losses			
Closed-down plant facilities			
Waste water treatment			
Waste disposal			
Sum			

Table 14: Compilation of all investigated objects of one site

Further action

6.7 Summarized results and preliminary assessment of the property

Name of the property: ***model factory***_____

Used Map ***Land register map 2003_11_03 1: 10.000***_____

Table 15 shows the data compilation of all investigated sites of one property listed in checklists. The summarized results of the investigation give a complete overview about

- the estimated risk to water bodies in case of flooding,
- site dimensions and
- a ranking list of all necessary measures to enhance the safety of the most dangerous sites

Sequential number	Investigated site	WRI_A	Site dimension [m^2/ m^3]	Further action
Sum				

The contaminated sites are ranked according to the following criteria: WRI_A > Site dimension

Table 15: Data compilation of all investigated sites in one property

6.8 Photo Documentation

The photo documentation should include the following information:

Name of the property: ***model factory***_____

Used Map ***Land register map 2003_11_03 1: 10.000***_____

6.8.1 Overview

Includes photographs and maps, which give an overview of the whole property and the location.

6.8.2 Site Description

Includes photographs, which helps to describe the several investigated sites of one property.

6.8.3 Illustration of Hot Spots

Includes photographs, which shows areas of a site, which are high contaminated and should be mainly treated.

7 Part 3 –List of measures

All identified and gathered measures have to be compiled and separated in immediate measures (short term) and investigations (medium and long term).
The measures have to be concretised. The measures should be fixed in a time schedule and specified with the responsible operator. Examples are shown in Table 16 and Table 17.

7.1 Proposed immediate measures

Investigated site	Identified action needed								Formulated measures	date	responsible
	Proof of stability	Improving of the dam stability	Improving of the dam dimension	Decontamination measures	Removal of contaminants	Sealing or encapsulation	Anchoring, fixing or locking	other			

Table 16: Proposal immediate measures

7.2 Proposed investigation measures for further proceeding in medium and long term

Investigated site		Identified information gap							Formulated measures	date	responsible
Name	located	State of the art	Situation unidentified/ unknown	no activities planned or started	Historical investigation	Preliminary investigation	Detailed investigation	remediation investigation not completed			

Table 17: Proposal for investigation measures

Comments:

- *If the situation at site could not be identified by implementation of the checklists, a historical investigation and further site visits should be performed.*
- *If no activities are planned or started, a concept for remedial actions must be elaborated if the assessment suggests a high risk at site. Necessary measures should be more concretised in the following investigation steps..*
- *If urgent measures are completed, the site has to be controlled or monitored to verify the success of the measures.. A concept for following safety measures with lower priority can now be concretised. (E.g. further investigation of other areas of the industrial site with lower hazard suspicion).*
- *If the contamination history is completed and suggests a high risk at site, a preliminary investigation should follow.*
- *If the preliminary investigation is completed, a concrete answer must be given, if a risk is existing or not. A concept for a detailed investigation must follow, if the high risk is still suspected but not totally proved.*
- *If the detailed investigation is completed, a concrete answer must be given, if there is a hazardous impact to water in case of flooding caused by the investigated substances. If yes, a concept for concrete measures must be elaborated in a remediation investigation.*
- *If the remediation investigation is completed, the best solution must be announced for tendering. The best offer in question of technical and cost effectiveness should be realized.*
- *If the remediation is completed, monitoring and technical control of the effectiveness of the measure must follow.*

Annex 8

Methodology for the Pre Assessment of Suspected Contaminated Sites in Flood Risk Areas in the Danube River Basin

Methodology for the Pre Assessment of Suspected Contaminated Sites in Flood Risk Areas in the Danube River Basin

Prepared by:

in the

Berlin, March 5th 2004

Background

Contaminated sites caused by former industrial activities like in figure 1 pose a potential danger for the environment; especially contaminated sites containing hazardous substances which could lead to a significant contamination of water bodies, if the substances will be mobilised (e.g. floods). During the last years the dramatic floods at Elbe, Danube and Oder have shown that the toxic impact of those contaminated sites could cause a significant harm to water bodies in Europe. For that reason the ICPDR decided to draw up a basin wide inventory of contaminated sites (CS) in flood risk areas in the Danube river basin.

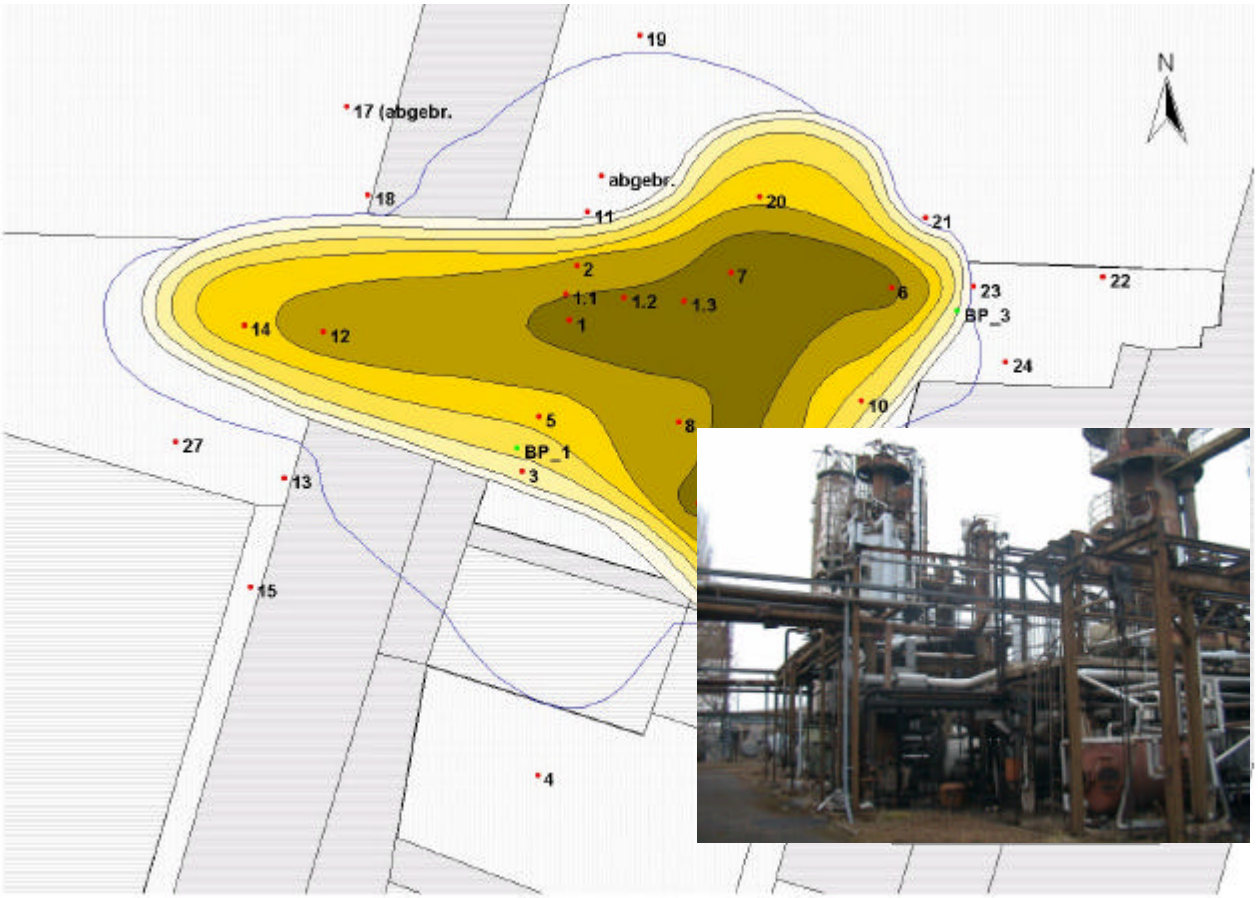


Figure 1: Oil contamination in an industrial area

Problem to be Solved

For the Danube river basin recommendations are necessary, which enable the competent authorities of the riparian countries to maintain the following activities:

- Establishment of a methodology for a preliminary risk assessment of the CS reported in the inventory of the Danube countries
- Drawing up recommendations for respective safety measures which could serve as regulatory guidelines.
- Drafting a Measure catalogue for the exemplary implementation of these safety guidelines.

Objective of the Project

The major goal of the project is to develop in a first step a methodology for an initial risk assessment of contaminated sites in flood risk areas, based on the data of the inventory of contaminated sites in the Danube river basin. The reported sites where a high risk potential has to be assumed can be screened by an preliminary assessment.

This methodology will serve as a guide for the elaboration of safety recommendations and a concrete measure catalogue in the next steps. For the assessment an agreed procedure has to be developed in accordance to the inventory of accidental risk spots (ARS inventory).

In the next step the detailed analysis of the exemplary hot spots will lead to the elaboration of safety recommendations for CS. Together with a detailed measure catalogue these recommendations will serve for a checklist which allows the competent authorities to improve the safety of the CS and respectively to reduce the risk of contamination of the Danube.

Selection of Suitable Proceedings as a Basis for the Methodology Development

Assessing the risk of the reported sites based on the existing data is associated with the following difficulties:

- The delivered data vary in quality and are partly incomplete
- The amount of the toxic substances and sometimes even the type of substances in the contaminated soil is often not known.
- Degradation process may have started, so metabolites (some of them toxic) and breakdown products may present.

The estimation of the contaminants is therefore difficult and linked with a high inaccuracy. Because of this, the use of water risk classes was proved to be difficult and didn't show suitable results.

Hence, in a first approach a method was suggested that is based on the practical experience gained by an initial risk assessment of more than 25.000 potentially contaminated sites in the German Federal State of Saxony. This method, simplified and adapted to the needs of the special situation at the Danube, was discussed in the small working group and affirmed by the 27th APC Group. It is explained in the following.

Description of the First Draft of the Methodology

The adapted methodology allows the initial risk assessment of CS by applying the following parameters:

- The toxic potential of soil or waste according to the harmful substances to be expected in a type of waste or in a specific industrial branch is expressed as a risk value.
- The size of the contaminated volume or area.

For each waste type of the EUROPEAN WASTE CATALOGUE (examples given in table 1) and each branch of the BRANCH CATALOGUE OF GERMANY (examples given in table 2) a risk-value r0 was developed in classes from 1 until 5. This risk factor r0 is derived by experience gained in several German Federal States (e.g. Saxony) and takes into account the toxic potential of soil or waste that can be expected from a branch or waste specific contamination.

For some wastes or branches a range of risk is given (e.g r0 from 3-5). The first figure corresponds to the lowest class of risk to be expected, the higher figure indicates the highest class of risk ("worst case") to be expected. This opens up the possibility for an expert judgement to adjust the r0 value if further information about the site is available (e.g. if the contaminants are known). In this case the liability of the assessment is improved. In the other cases, the average risk value is calculated and rounded up. The risk values r_0 should be between 1 and 5.

The risk values are linked with the site magnitude (specified in case of old deposits as volume [m³] or in case of old industrial sites as surface area classes [m²]) to an "initial risk factor" m1, which gives an information about the potential risk of each site (see example in figure 2).

For example:

- A site with a contaminated volume of 200.000 m³ (> 100.001 m³ and < 500.000 m³) with a risk value of 5 receives an m_1-value of 55.
- A site with a contaminated area of > 5.000 m² with a risk value of 4 receives an m_1-value of 49.

Not all of the detected contaminated sites in the Danubian Region could be assessed. So the assessment was concentrated only at those sites, which are potentially impacted by floods. Additionally only those sites should be investigated, which include more than 100.000 m³ of contaminated volume or cover an area larger than 5.000 m² (see illustration of the exclusion criteria in figure 3).

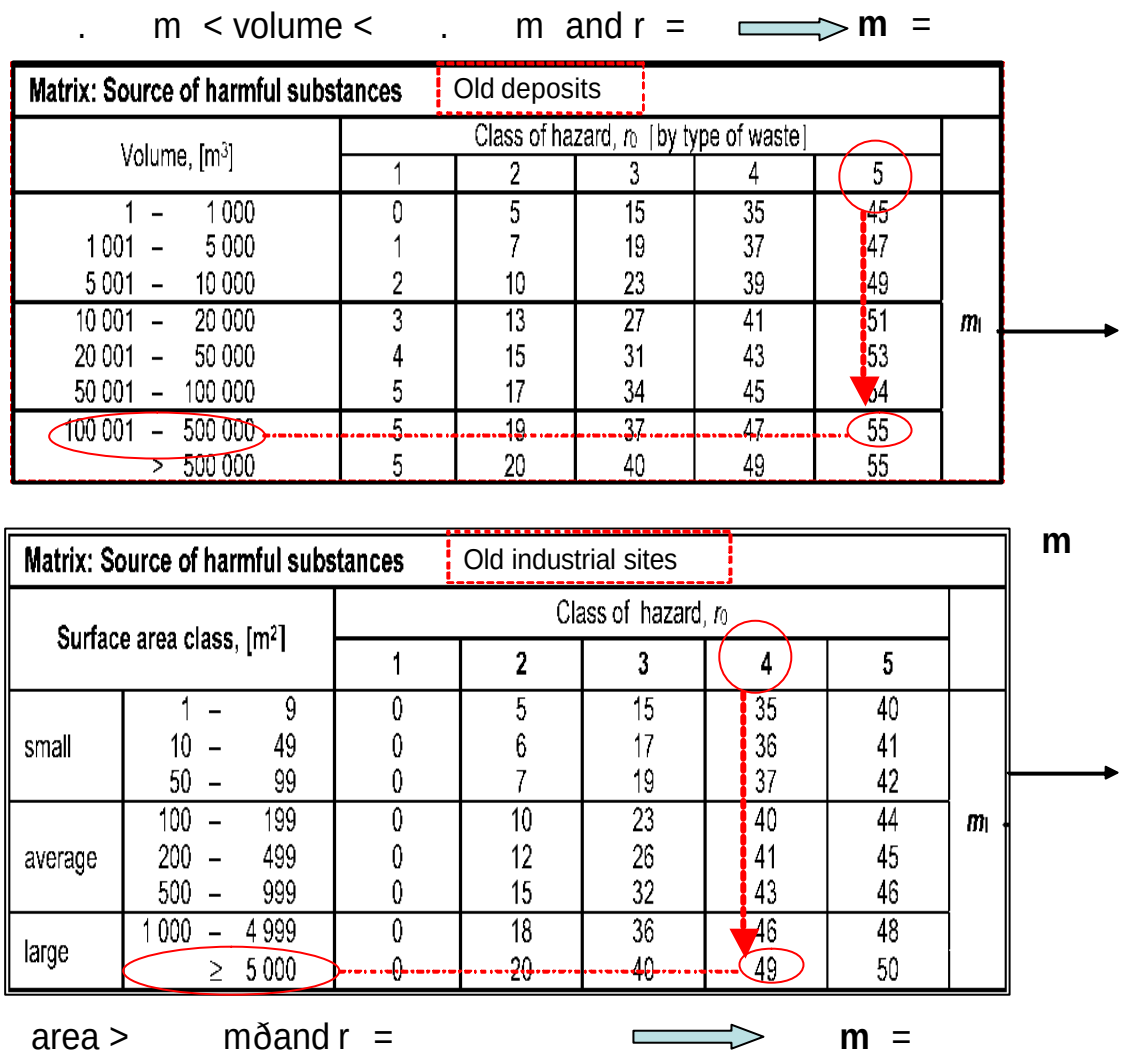


Figure 2 : Illustration of the determination of the m1-value

Table :
List of wastes pursuant to Article (a) of Council Directive / /EEC on waste (EUROPEAN WASTE CATALOGUE).
e.g.
WASTE RESULTING FROM EXPLORATION, MINING, DRESSING AND FURTHER TREATMENT OF MINERALS AND QUARRY

CODE	**WASTE TYPE**	***r* VALUE Average (Min,Max)**
	Waste from mineral excavation	. (-)
	Waste from mineral metalliferous excavation	. (-)
	Waste from mineral non-metalliferous excavation	. (-)
	Waste from mineral dressing	. (-)
	Waste from the dressing of metalliferous minerals	. (-)
	Waste from the dressing of non-metalliferous minerals	. (-)
	Waste from further physical and chemical processing of metalliferous minerals	. (-)

The r values " " and " " are both considered as beeing " "

Table :
Branch related hazard classifying of industries
(Branch catalogue of Germany)
(e.g.)
MANUFACTURING AND PROCESSING INDUSTRIES

BRANCH No	BRANCH NAME	Class of Hazards r Min and Max
	Gas, mining, related products	-
	Gas production (town gas)	-
	Coal mining	-
	Brown coal mining and briquette production	-
	Ferrous ores mining	-
	Production of non-ferrous metals	-
	Potassium and rock salt mining	-
	Petroleum and natural gas extraction	-
	Cocking	-
	Briquettes coal production	-

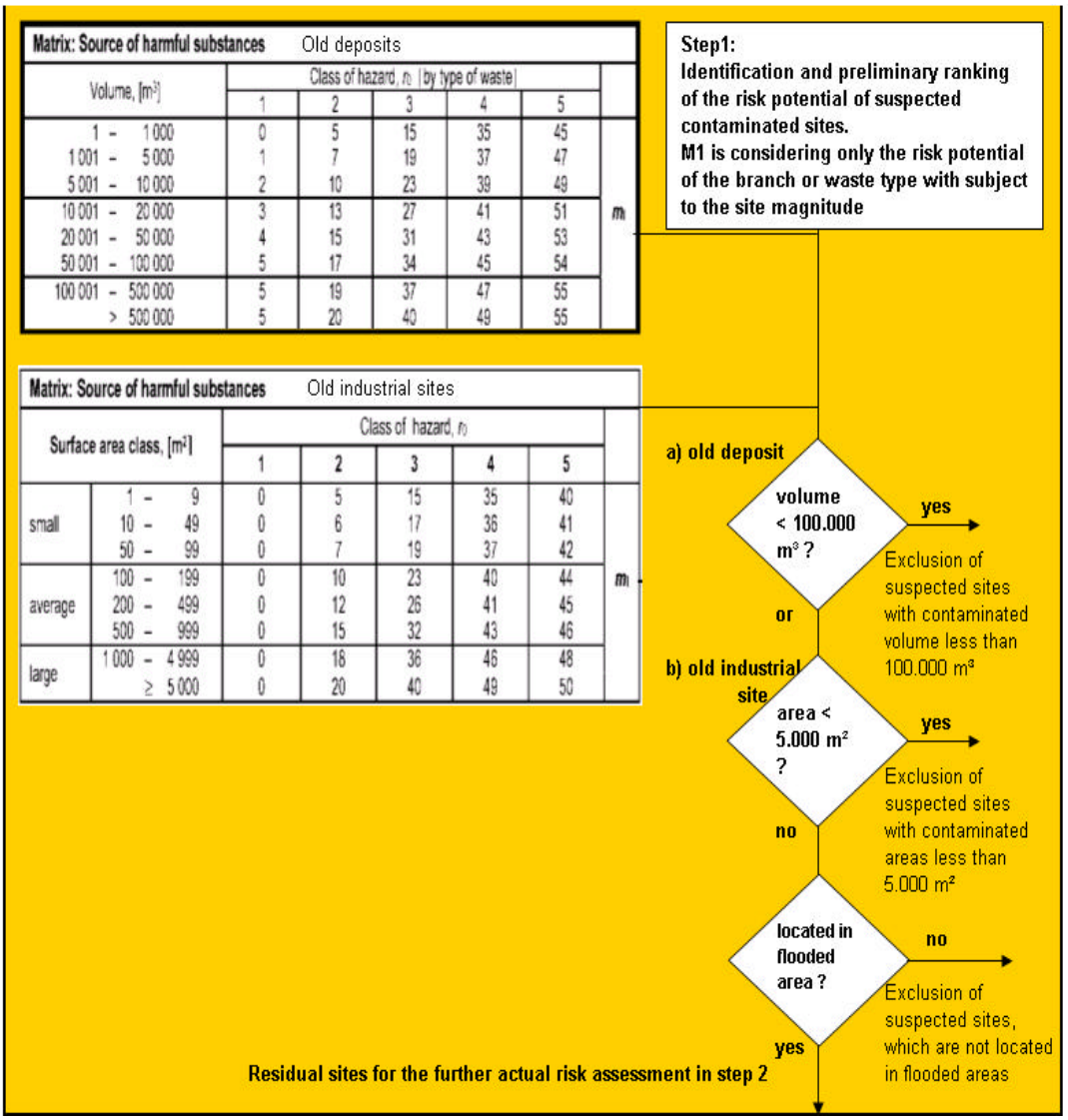


Figure 3: Exclusion criteria used in the first draft of the m1-methodology

On this basis the Danubian countries reported till now 261 CS in potentially flooded areas of the Danube. For these CS a ranking list according to the m1-methodology was drawn up and priority spots of further investigation were detected.

Results of the first Ranking and Interpretation Problems

The inventories of each country, assessed by m1-methodology, as described above resulted to 103 evaluable sites of total 261 sites, which represented a degree of 39,5%.

Nearly 50 sites reached an m1-value of equal or more than 45, corresponding to high risk value and 90 sites have an m1-value of more than 37, which still indicates a relevant risk potential.

The first 67 sites, which were classified by contaminated volume (waste deposits), are shown in the following table:

Country	Number of sites with a contaminated voume of higher than 100.000 m³	Percentage
Austria	5	7,46
Germany	2	2,99
Hungary	29	43,28
Romania	12	17,91
Slovakia	17	25,37
Ukraine	2	2,99
Total	67	100,00

Table 3: Result of the first ranking of CS in the Danube Region*

* The list does not include the 11 contaminated industrial sites, which were additionally listed by the Austrian experts.

At least the use of this methodology for the site assessment led to the following problems as stated by the expert group:

- Because of missing data like the amount of contaminated volume or a missing classification of the risk value the evaluation and interpretation of the data was difficult. So in some cases the risk values were estimated It has to be considered that the estimated data have a high inaccuracy which could lead to a wrong evaluation of the sites, but are sufficient for a screening.
- Waste deposits and abandoned industrial sites: Apart from the Austrian data, the inventories from all other countries did report waste deposits where the size is classified as a volume. Austria also reported properties of abandoned industrial sites (for example mineral oil refinery) classified by surface area. A conversion into contaminated volume is not possible, because contamination is concentrated in hot spots and normally not evenly distributed over the whole site. We therefore decided to leave those sites in a separate table.
- 7 sites (3 sites in Romania and 2 sites in Slovakia and 1 site each inHungary and in the Czech Republic) reached the m1 values higher or equal 47, but with contaminated volumes lower than 100.000 m³.. This emphasises the fact that also smaller sites but with highly toxic substances can represent a hazard for the environment.

A lot of screened sites with a contaminated volume larger than 100.000 m³ could not be further differentiated with the present tables in figure 2. The example of the Austrian sites should be emphasised (see appendix 1), where the pre-selection and screening of the sites made by the Austrian Federal Agency led already to sites with very similar high hazard potentials. A further differentiation of those sites is not possible with the given data and this methodology.

As a result of the expert group meeting in Ljubljana, it was stated the following:

- The “m1-methodology” is the first step of the assessment as shown in figures 2 and 3. It is a tool for a first screening step . For the present methodology the expert group suggested to extend and to divide the categories of the large sites (> 100.000 m³ and > 5.000 m²) to an open score, which allows a better differentiation of the large sites.

The expert group amendments led to the following consequences for the m1-methodology:

- With the demand for an open score for the site categories, maximum values of 55 and 50 like in the first approach of the m1-methodology could not be used any longer. The range of the tables should be extended.
- For improving the assessment, it was also discussed that in the future a parameter concerning the flood probability should be integrated. The attempt to get data concerning the flood probability of each sites did not succeed. It was agreed, that a harmonised approach for the Danubian Countries is needed.

Resulting Methodology according to the Amendments of the Expert Group

New evaluation tables were elaborated according to the formulated requirements of the expert group, where the range of site magnitudes was extended aiming at a better differentiation of the sites which are larger than 1.000.000 m³ or 10.000 m².

At first it was intended to calculate the m1-values of the extended size classes by interpolation based on the value of the old table. The result is shown in figure 4.

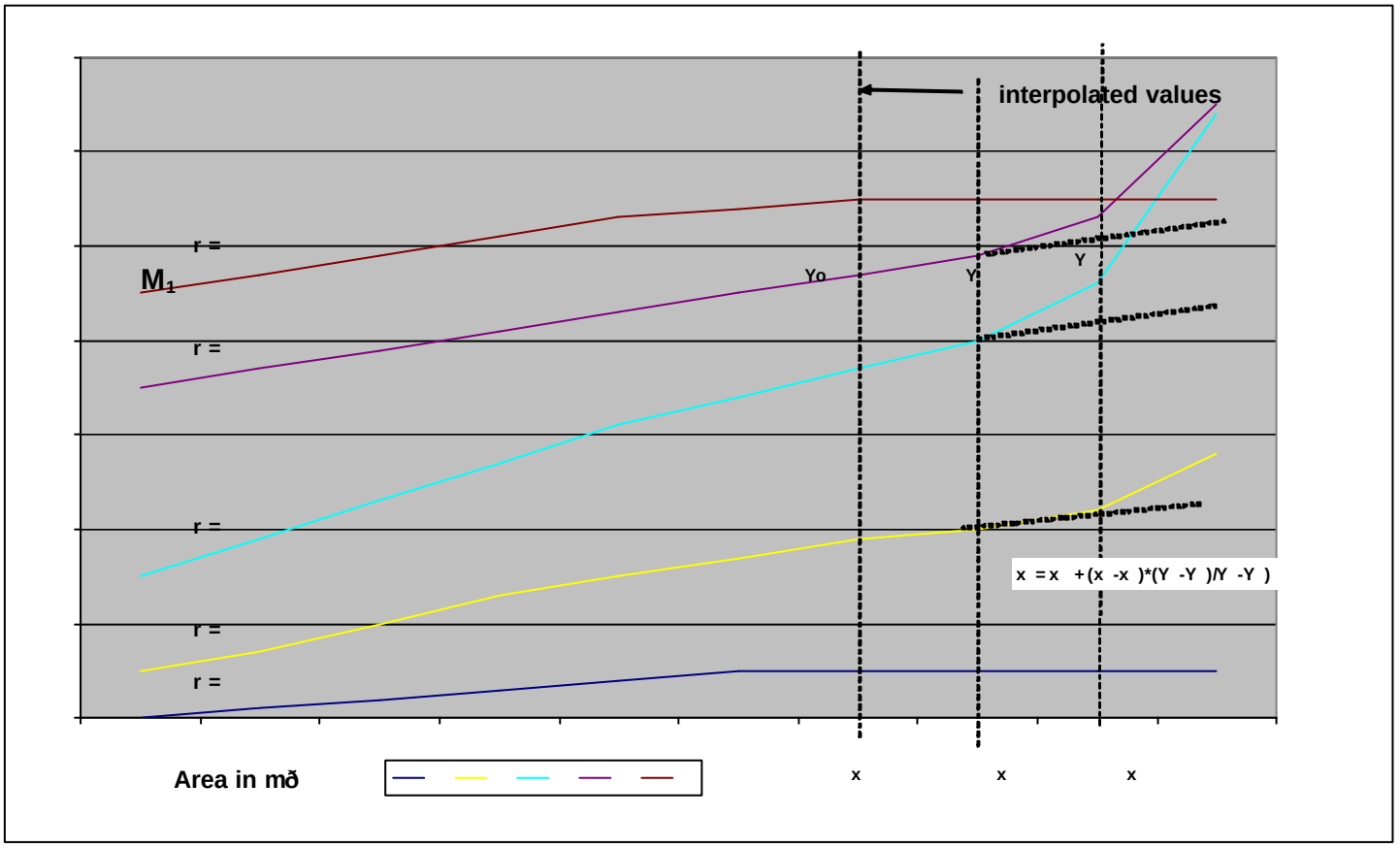


Figure 4: Results of the first attempt to calculate the values according to the extended Range of the evaluation table.

The interpolation led to m1-values, which were not consistent in the different classes of risk values (r_0 = 3 and r_0=4). So this approach failed for the table extension.

Alternatively we fixed the table values in the column of r_0=5 until to the maximum value of 60 and calculated the other values according the rule of proportion or the average value. It led to a better result as to be seen in the next figure 5.

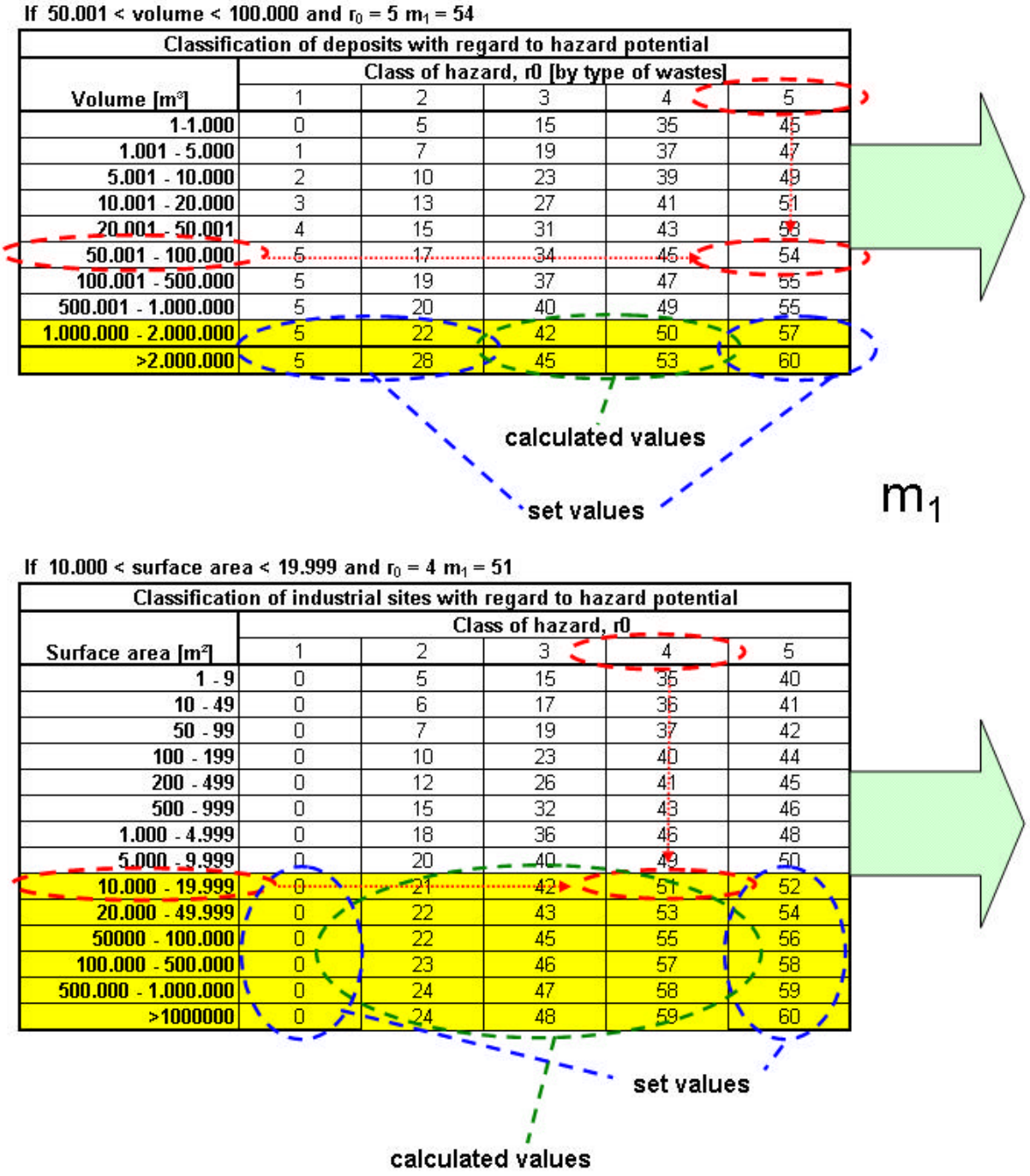


Figure 5: Evaluation table with extended size classes

With the revised evaluation table a new ranking of CS was performed, which led to the following results (see appendicies 3 and 4):

- For sites classified by surface area like the Austrian sites (see appendix 3) it was possible to differentiate between some of the sites which had before the same initial risk value m. A further differentiation is not reasonable with the given data. Only the flood probability could be used as a further criterion, because the Austrian experts defined it for their sites.
- The sites classified by volume could be slightly more differentiated. Additional data and criteria would be necessary for allowing a finer ranking. the table has to be seen as a first screening of those sites, which have to be preferably visited and investigated further. All sites with an initial risk value equal or higher than 50 should be inspected to perform a risk assessment by using the checklist. Also the criterion of flood probability should be discussed for those sites in view to a better differentiation .

The methodology is not an optimised tool for the ranking of CS, but it is a sufficient tool for a site screening which should be the preliminary step. A deeper ranking is not possible at this investigation stage, because the inaccuracy of the data is very high. Therefore the extension of the table score did not achieve a detailed ranking. Such a more detailed ranking is possible after a site visit where data about the contaminated surface/volume and the risk class could be concretised. Based on that secured data base a further ranking of CS can be performed.

Appendix 1: Result of the ranking of the site classified by surface area (Austrian sites)

Country	Region	county	community	location/ nar	or old industrial	branch	in the timeframe	hazardous substances	r0/ estimated risk factor	area in sqm	M1	by Floods, Flood
Austria	Kärnten	Klagenfurt	Klagenfurt	Leather factory I	industrial site	Lederverarbeitung	1922-1989	Chrom	4,5	120.000	50	LOW
Austria	Kärnten	Sankt Veit an der Glan	Brückl	Donau Chemie Brückl	industrial site	Chemische Grundstoffin	1909-1989	CKW, Trichlorethen,	6	50.000	50	MIDDLE
Austria	Niederöstereich	Korneuburg	Korneuburg	refinery Tuttendorfer	industrial site	Mineralöl-Raffinerie	1923-1960/61	Mineralöl, CKW	4,5	180.000	50	LOW
Austria	Niederöstereich	Korneuburg	Korneuburg	Shipyard Korneuburg	industrial site	Schiffbau	1845-1994	Metalle, Mineralöl	4	200.000	50	LARGE
Austria	Niederöstereich	Korneuburg	Korneuburg	Tankfarm Mare	industrial site	Mineralöllager	1930-1990	Mineralöl	4	10.000	50	LARGE
Austria	Niederöstereich	Mödling	Vösendorf	refinery Vösendorf	industrial site	Mineralöl-Raffinerie	1920-1960	Mineralöl, PAK	4,5	145.000	50	LOW
Austria	Wien	11. Simmering	Wien	EBS-BP-TKV	industrial site	Mineralöllagerung,	end of 19th century-1989	Mineralöl, CKW	5	200.000	50	LOW
Austria	Wien	11. Simmering	Wien	Gas works Simmering	industrial site	Gaswerk	1900-1975	PAK, Cyanid, Mineralöl,	5	325.000	50	LOW
Austria	Wien	11. Simmering	Wien	Teerag-Asdag-Simmering	industrial site	Teerverarbeitung	1914-1989	PAK, Phenole, BTX	5	130.000	50	LOW
Austria	Wien	22. Donaustadt	Wien	Tankfarm Lobau	industrial site	Tanklager für Mineralölpro	1934-1989	Mineralöl, Kohlenwasserst	5	1.000.000	50	LOW
Austria	Wien	23. Liesing	Wien	Siebenhirten	industrial site	Chemische Grundstoffin	ca. 1828-1989	Cyanid, Kohlenwasserst	5	150.000	50	LOW

Appendix 2:
Result of the ranking of the sites classified by contaminated volume (All Danubian sites))

Rank	Country	Region	county	communit	location/ name	deposit type	capacity in m³	Risk value n	Risk Potential according old m1
1	Hungary	Central Transdanubian Environmental Iinspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1.500.000	5	55
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd		1.450.000	5,0	55
3	Romania		Sibiu		Copsa Mica	industrial waste	1.350.000	5	55
4	Romania		Hunedoara		Calan	slag and ash pond	1.300.000	5	55
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	350000	5	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55
9	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200.000	5	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		23300 per day	4	55
11	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industriemüll	500.000	5,0	50
12	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl I/II	Industrieabfälle, Bauschutt, Aushubmaterial	250.000	4,5	50
13	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1.000.000	4,0	50
14	Austria	Niederöstereich	Tulln	Tulln	Landfill Tulln	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	200.000	3,5	50

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
15	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	Bakonyi Erőmű Inc.	gray sludge	15.000.000	4	49
16	Romania		Bacau		Letea Veche	slag and ash pond	13.150.000	4	49
17	Hungary	Middle Danube Environmental Inspectorates area		Lőrinci	Fixon Bt.-Humiron Ltd.	slag and dust ash	5.000.000	4	49
18	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hőerőmű		1.400.000	4	49
18	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc.(technology waste-water thickerer)	waste water sludgein lake	1.300.000	4	49
20	Romania		Teleorman		Tumu Magurele	pyrite ash pond	1.900.000	4	49
21	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49
22	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49
23	Slovakia				DUSLO, Šala	sludge bed	750000	4	49
24	Slovakia				CHEMKO, Strazske	leach out during	600000	4	49
25	Romania		Dolj		Calafat	slag and ash pond	655.000	4	49
26	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47
27	Slovakia				ENO, Zemianske Kostolany	deposit of fly-ash	300000	4	47
28	Slovakia				KOVOHUTY, Krompachy	leach out during flood	285000	4	47
29	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47
30	Germany		Dillingen	Dillingen	Hühnerwörth		470.000	4,0	47

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
31	Hungary	Central Transdanubian Environmental Iinspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212.000	4	47
32	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	Tisa Chemical Self-contained plant		211.000	4	47
33	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47
34	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	345000	4	47
35	Romania		Dolj		Calafat	industrial waste	435.000	4	47
36	Hungary	North Hungarian Environmental Inspectorate Area		Mezőkövesd Air	Mezőkövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47
37	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abandon sewage sludge depots	300.000	4	47
38	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350.000	4	47
39	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120.000	4	47
40	Austria	Kärnten	Villach Land	Ferndorf	Industrial deposit Heraklithwerke Ferndorf	Industrieabfälle	500.000	3,5	42
41	Slovakia				NCHZ, Novaky	deposit of calc-sludge	12000000	3	40
42	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 03/29,30,31	VII. Reservoir for red-dross	3.250.000	3	40
43	Hungary	Central Transdanubian Environmental Iinspectorates Area		Ajka	MAL Inc. I-VIII. store, reclaimed	red dross settlements	29.000.000	3	40
44	Romania		Hunedoara		Mintia	slag and ash pond	9700000	3	40
45	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/8	VI. Reservoir for red-dross	1.800.000	3	40

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
46	Hungary	Upper Danube Environmental Inspectorates area			Neszmély 0125	VIII. Reservoir for red-dross	5.000.000	3	40
47	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 118	III. Reservoir for red-dross	1.000.000	3	40
48	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/10	V. Reservoir for red-dross	800.000	3	40
49	Hungary	Upper Danube Environmental Inspectorates area			Almásfüzitő 06/12	IV. Reservoir for red-dross	600.000	3	40
50	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	TVM Inc. (waste of chemical industry)	polluted earth	600.000	3	40,0
51	Hungary	Körös Environmental Inspectorates Area		Békéscsaba	Establishmen organic waste	reclaimed waste storage	780.000	3	40
52	Hungary	Middle Danube Environmental Inspectorates area		Budapest, XXII. Harangozó u.	Metallochemia	metalslag	650.000	3	40
53	Slovakia				DROTOVNE, Hlohovec	Fe- sludge bed	160000	3	37
54	Hungary	Environmental Inspectorates			Almásfüzitő 119/11 Hrsz	I-II Reservoir for red-dross	450.000	3	37
55	Slovakia				TKO, Kysucke Nove Mesto	closed deposit of fouling industrial sludge	150000	3	37
56	Hungary	North Hungarian Environmental Inspectorate Area		Tarnaszentmári	MH – Tarnaszentmária Fuel depot		69.000 and 69.000	4	37
57	Hungary	North Hungarian Environmental Inspectorate Area		Mezőkövesd Hrs	MH – Mezőkövesd Fuel depot „K" area		52.500 and 67.500	4	37
58	Hungary	Middle Danube Environmental Inspectorates area			Tököl		308000 and 209.900	3	37
59	Romania		Dambovita		Doicesti	slag and ash pond	500.000	3	37
60	Romania		Tulcea		Turcoaia	sterile pond	440000	3	37

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1
61	Romania		Dolj		Calafat	industrial wastes	435000	3	37
62	Hungary	South Transdanubian Environmental Inspectorates Area		Mohács		settlement waste	370.000	3	37
63	Hungary	South Transdanubian Environmental Inspectorates Area		Barcs		settlement waste	300.000	3	37
64	Hungary	Körös Environmental Inspectorates Area		Gyula	Establishmen organic waste		273.773	3	37
65	Hungary	Middle Tisa Environmental Inspectorates Area		Jászberény	ELEKTROLUX - LEHEL Ltd WDS-1 (waste of chemical industry)	polluted earth	155.000	3	37,0
66	Hungary	South Transdanubian Environmental Inspectorates Area		Harkány		settlement waste	114.000	3	37
67	Hungary	South Transdanubian Environmental Inspectorates Area		Siklós		settlement waste	112.000	3	37

Appendix 3: Result of the ranking of the Austrian sites dassified by surface area using the adapted methodology

Rank	Country	Region	county	communit	location/ name	Endangered by Floods, Flood frequency	river	area in s	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Austria	Wien	22. Donaustadt	Wien	Tankform Lobau	1	Danube	1.000.000	5,0	50	59,00
2	Austria	Wien	11. Simmering	Wien	Gas works Simmering	1	Danube	325.000	5,0	50	58,00
3	Austria	Wien	11. Simmering	Wien	EBS-BP-TKV	1	Danube	200.000	5,0	50	58,00
4	Austria	Wien	23. Liesing	Wien	Siebenhirten	1	Liesing	150.000	5,0	50	58,00
5	Austria	Wien	11. Simmering	Wien	Teerag-Asdag-Simmering	1	Danube	130.000	5,0	50	58,00
6	Austria	Niederösterreich	Korneuburg	Korneuburg	refinery Tuttendorfer Breite	1	Danube	180.000	4,5	50	58,00
7	Austria	Niederösterreich	Korneuburg	Korneuburg	Shipyard Korneuburg	3	Danube	200.000	4,0	50	57,00
8	Austria	Niederösterreich	Mödling	Vösendorf	refinery Vösendorf	1	Petersbach	145.000	4,5	50	57,00
9	Austria	Kärnten	Klagenfurt	Klagenfurt	Leather factory Neuner	1	Glan	120.000	4,5	50	57,00
10	Austria	Kärnten	Sankt Veit an der Glan	Brückl	Donau Chemie Brückl	2	Gurk	50.000	5,0	50	56,00
11	Austria	Niederösterreich	Korneuburg	Korneuburg	Tankform Mare	3	Danube	10.000	4,0	50	51,00

Appendix 4: Result of the ranking of the sites classified by volume using the adapted methodology

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
1	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunaferr Inc.	industrial sewage sludge	1.500.000	5	55	57
2	Germany		Stadt Straubing	Stadt Straubing	Deponie Peterswöhrd		1.450.000	5,0	55	57
3	Romania		Sibiu		Copsa Mica	industrial waste	1.350.000	5	55	57
4	Romania		Hunedoara		Calan	slag and ash pond	1.300.000	5	55	57
5	Romania		Hunedoara		Calan	slag and ash pond	1300000	5	55	57
6	Slovakia				ZSNP, Ziar n./Hronom	alkaline water	1000000	5	55	55
7	Slovakia				A.S.A. Zohor	deposit of mixed danger waste	390000	5	55	55
8	Slovakia				Skladka odpadov OFZ, Siroka	deposit of industrial arsenical waste	600000	5	55	55
9	Austria	Kärnten	Sankt Veit an der Glan	Althofen	Landfill Roßwiese	Industrieöl	500.000	5,0	50	55
10	Ukraine				The Odessa area Izmail Cellulose cardboard combine		200.000	5	55	55
11	Hungary	Central Transdanubian Environmental Inspectorates Area		Ajka	Bakonyi Erőmű Inc.	gray sludge	15.000.000	4	49	53
12	Romania		Bacau		Letea Veche	slag and ash pond	13.160.000	4	49	53
13	Hungary	Middle Danube Environmental Inspectorates area		Lőrinci	Fixon Bt.-Humiron Ltd.	slag and dust ash	5.000.000	4	49	53
14	Ukraine				The Odessa area Izmail Cellulose cardboard combine		29300 per day	4	56	53

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
15	Austria	Kärnten	Sankt Veit an der Glan	Brückl	lime dump site Brückl I/II	Industrieabfälle, Bauschutt, Aushubmaterial	250.000	4,5	50	51
16	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	AES borsodi Energetikai Ltd Tiszapalkonyai Hőerőmű		1.400.000	4	49	50
17	Hungary	Middle Tisa Environmental Inspectorates Area		Szolnok	Béghin-Say Cukorgyár Inc. (technology waste-water thickener)	waste water sludgein lake	1.300.000	4	49	50
18	Austria	Tirol	Schwaz	Pill, Weer	Landfill Pill	Hausmüll, Bauschutt, Industrie-/Gewerbemüll	1.000.000	4,0	50	50
19	Romania		Teleorman		Turnu Magurele	pyrite ash pond	1.900.000	4	49	50
20	Romania		Sibiu		Copsa Mica	industrial wastes	1350000	4	49	50
21	Slovakia				CHEMKO, Strazske	leach out during flood	800000	4	49	49
22	Slovakia				DUSLO, Šala	sludge bed	750000	4	49	49
23	Slovakia				CHEMKO, Strazske	leach out during	600000	4	49	49
24	Romania		Dolj		Calafat	slag and ash pond	655.000	4	49	49

Rank	Country	Region	county	community	location/ name	deposit type	capacity in m³	Risk value r0	Risk Potential according old m1	Risk Potential according new m1
25	Slovakia				PETROCHEMA, Predajna	overspill by heavy raining	120000	4	47	47
26	Slovakia				ENO, Zemianske Kostolany	deposit of fly-ash	300000	4	47	47
27	Slovakia				KOVOHUTY, Krompachy	leach out during flood	266000	4	47	47
28	Slovakia				BUKOCEL, Vranov n.Toplou	leach out during flood	153000	4	47	47
29	Germany		Dillingen	Dillingen	Höhnerwarth		470.000	4,0	47	47
30	Hungary	Central Transdanubian Environmental Inspectorates Area		Dunaújváros	Dunapack Inc.	mix sludge	212.000	4	47	47
31	Hungary	North Hungarian Environmental Inspectorate Area		Tiszaújváros	Tisa Chemical Self-contained plant		211.000	4	47	47
32	Slovakia				Skladka TKO, Turzovka	leaking tube line	105000	4	47	47
33	Slovakia				Teplaren, Povazska Bystrica	closed deposit of fly-ash of refuse inicinerating plant	346000	4	47	47
34	Romania		Dolj		Calafat	slag and ash pond	656000	4	47	47
35	Hungary	North Hungarian Environmental Inspectorate Area		Mezökövesd Air	Mezökövesd – „B" area Old Fuel depot		300.000 and 60.000	4	47	47
36	Hungary	Middle Danube Environmental Inspectorates area			Budapest, Csepel-island Nord	Abanden sewage sludge depots	300.000	4	47	47
37	Slovakia			A.S.A. Zohor	deposit of danger waste, oil waste		350.000	4	47	47
38	Slovakia			Predajna	deposit of gudrons PETROCHEMA		120.000	4	47	47

Annex 9

Photo Documentation of the Visits in Copsa Mica and Hunedoara

Annex 10

Pilot Project on Actual Risk Assessment of ARS

UNDP – GEF Danube Regional Project

Proposal for a

Pilot Project on Actual Risk Assessment of ARS

Prepared by:

Contact: A. Dahn (IABG)

Karl-Marx-Allee 90 a

10243 Berlin

Tel.: +4930 293991-33

Fax: +4930 293991-44

Pilot Project on Actual Risk Assessment of ARS

Background

Since the two accidents occurred at mining installations in Baia Mare and Baia Borsa in January and February 2000 basin inventory of potential accidental risk spots were carried out on behalf of the International Commission for the Protection of the Danube River (ICPDR).

For the classification of potential risk spots, a common procedure was elaborated considering actual European regulations and findings:

- The findings of the ICPE
- the EU „Seveso II" directive
- the „UN/ECE agreement on the effects of industrial accidents (Industrial accident convention)

Objective of this inventory was the Identification and preliminary ranking of potential accidental risk spots based on estimated water risk equivalents (WRC 3-equivalents) and calculated water risk index. About 650 risk spots were recorded and 620 were evaluated. As a result it could be identified a hazardous equivalent of about 6,6 Mio tons in the Danube catchment area. Emphasis was to point out the ***potential danger*** and not the ***actual danger***.

In consequence to this purpose the inventory led to results, that countries with industries comprising large amounts of water hazardous substances were automatically prioritised risk spots regardless, if safety measures were performed or not.

It is not surprising, that the high percentage of the hazardous substance and consequently the risk was located in Germany and also Romania, where the amount of hazard equivalents is significantly determined by one mining industry. According to the results of this proceeding Germany and Romania should be given the highest priority in safety measures, if potential danger would approximate the actual danger.

Thus the elaborated ranking of the risk spots could not give information to set priorities in actual needs for safety measure performance in these countries.

Identified needs for the further development of the ARS inventory

Further investigation is needed to identify the actual danger of ARS. This investigation has to meet the

- Need of harmonising the assessment, which is regarding also the enhancement of the safety level in each industry,
- need of further development of the checklist in consequence to the criteria, which will be developed/ determined for the evaluation of the actual risk,
- need of training and know how transfer for elaboration of measure catalogues and evaluation of achieved safety levels,
- need of verification of the adjusted checklists

Objective

Main objective is to develop a basin wide harmonised methodology, which helps to identify the actual risk of ARS. Therefore know-how transfer and discussion between all experts of the Danubian countries are needed, which enable the definition of agreed criteria for the actual risk assessment.

For the actual risk assessment the following aspects should be considered:

- Safety standards of installations and management, safety measures to be taken and already performed, regarding stepwise implementation
- lack of information in authorities about the industrial activity
- Harmonised proceeding for the assessment in every Danubian country
- Adaptation and verification of the checklists at industries with different developed safety levels

The findings of the investigations should lead to a branch related guide to be transferred to other enterprises as far as regional and national administrations.

Content

The requirement for further investigation could be met through a study, where three exemplary pilot industries of different development stages (related to the safety level) were chosen. Regarding the transferability of findings and the country specific aspects the industries should be chosen preferably in different Danubian countries, where different safety levels in the industries are expected. In addition the hazard potential of the pilot industries should be similar and comparable, so pilot of the same branch should be preferred. An example could be oil refineries in Germany, Croatia and Romania.

Based on the conditions of the three chosen factories evaluation criteria for the actual risk assessment have to be defined and checklists have to be developed, verified or adjusted through exemplary site visits.

The investigation of the industries should result to technical and organisational action plans, which cover measures for short, medium and long term aimed at an enhancement of safety level in the investigated industries of different development stages.

The development of the evaluation criteria and the checklists should be supplemented through an on site verification performed by the experts in their own country, which helps on one hand to perform a stepwise implementation of capacity building and a creation of sufficient expert opinion in relevant authorities and on the other hand it gives a feedback about the country specific needs, which have to be taken into consideration for the development of an assessment methodology.

Proposal for a work programme

Keeping these project requirements in mind the following formulated targets should be met:

Target 1 - Preparation of the investigative measures

Target 2 - Prioritisation of needed safety measures considering
- the actual danger of industries to water bodies and
- the effectiveness of the measure

Target 3 - Development and verification of methods and tools for the ARS assessment taking in consideration

- different development stages of industries
- different resulting measure catalogues for short medium and long term measures

Target 4 - Strengthening of authorities in the development and elaboration of measure catalogues for the safety level enhancement of ARS

The tasks arising from the formulated targets are shown in figure 1 including also the belonging tasks, work packages and activities, which will be briefly described in the following.

Work package 1 – Preparatory activities

In this work package the project will be initialised. The target and goals of the work packages and activities will be concreted according to the country specific needs. Additionally technical terms must be defined and agreed to achieve a consistent terminology and to avoid, that the handbook, which has to be developed, will be interpreted differently. It is also needed for the harmonisation of the whole pilot project proceeding, which is aiming at a compliance of all activities and all products resulting from the activities. Both tasks will be performed within activity 1.1.

Based on the concreted targets and goals the work program will be specified in detail in the framework of the activity 1.2. The competence for every activity and for every industry to be investigated as far as the interfaces between the activities has to be determined.

In parallel to the concretion of the work program suitable pilot industries and branches will be proved and contacted for the project performance. With the chosen industrial partner the time schedule for the project performance will be concretised for a harmonised project performance.

Work package 2 - Elaboration of an evaluation methodology

For the elaboration of an effective measure catalogue the actually needed safety measures have to be identified, prioritised and specified. So it is very important to emphasise the relevant factors, which are significantly determining for the specification of the actual danger (activity 2.1). It has to be proved if aspects like

- safety standards of installations and management,
- lack of information in authorities about the industrial activity
- ratio of performed and needed safety measures

- development stages of the industries
- and lack of information, know how transfer and training needs

are sufficient for the description of the actual danger of an industry.

In any case there is a need of an international and interdisciplinary discussion before suitable evaluation criteria can be formulated and adopted (activity 2.2). Criteria could be for example

- present safety level in comparison to demanded safety level
- present information in comparison to demanded information level
- state of the art in safety techniques
- present legal requirements
- operational requirements

Based on the determined criteria a draft methodology for the identification of safety requirements should be elaborated, which helps to prioritise measures according to the identified safety demands and their effectiveness (activity 2.3). After a presentation in an APC Panel and finally discussion in an EG Meeting the draft will be completed and the developed methodology has to be approved for the on the spot investigation.

Work package 3 - Site Visits and Transfer of the Findings

Aimed at a verification of the developed methods and tools for the ARS assessment a program for the site visits has to be elaborated, where checklists and afore mentioned methodologies should be implemented (activity 3.1).

Site visits have to be performed (activity 3.2) to verify the checklists and methodologies with regard to their practicability for the further actual risk assessment of ARS. After the visits an evaluation of the findings will take place to recommend, adapt the tools (activity 3.3) and finally to complete the developed methodology (activity 3.6)

In activity 3.4 all findings will be compiled and prepared for a structured measure catalogue and recommendations about the actual risk assessment of ARS, which should be transferred to all relevant authorities.

This catalogue should be combined with know how transfer through on site verification (activity 3.5) performed by the national experts in their own country. The findings of this verification should deliver the adjustment of the recommendations and of the measure catalogue, which should finally result to a hand guide for experts.

Work package 4 - Measure catalogue and hand guide

In this work package findings and the know-how elaborated in the third work package will be completed to a hand guide, that should help to strengthen the authorities in the development and elaboration of measure catalogues for the enhancement of the ARS safety level.

A frame work of guidelines will be elaborated for the hand book, which has to consider legislative, technical and administrative aspects. The frame work, discussed and confirmed within the APC Panel consultation, should serve as a basis to structure the handbook.

The draft of this hand guide should be implemented with regard to its practicability, in different Danube countries, so that any country specifics could be considered in the implementation phase. The amendment statements will be integrated in the draft of this hand guide before it will be discussed in the final discussion in the EG Meeting.

Documentation and presentation of the project

Aiming at a transparent project performance all opportunities will be used to present the project results in interim and final reports and in expert group meetings. Agreed products of the projects will be also finally presented within the EG Meeting and other international meetings.

Expected results

After the project the following products should be available:

- Evaluation criteria for the ARS assessment in view to the actual danger
- Agreed methodology for the actual risk assessment and a harmonised proceeding of the assessment
- Hand guide to identify the needed safety measures

Proposal for suitable industries

Suitable industries for the investigation could be oil refineries or mining industries. The following countries would be useful to be involved in this project if oil refineries would be the subject of investigation:

Germany (PCK Schwedt)

Croatia (Rijeka)

Romania (SN Petrom SA ??)

Duration of the project

Preparatory activities	2 month
Elaboration of an evaluation methodology	3 month
Site visits and transfer of the findings	6 month
Measure catalogue and hand guide	3 month
Sum	.14 month

Conclusion

We would recommend to implement a pilot project for further investigations on safety measures at exemplary risk spots in three countries with safety levels of different development stages, where the Danubian countries will be the beneficiaries of international and multidisciplinary know how and technology transfer.

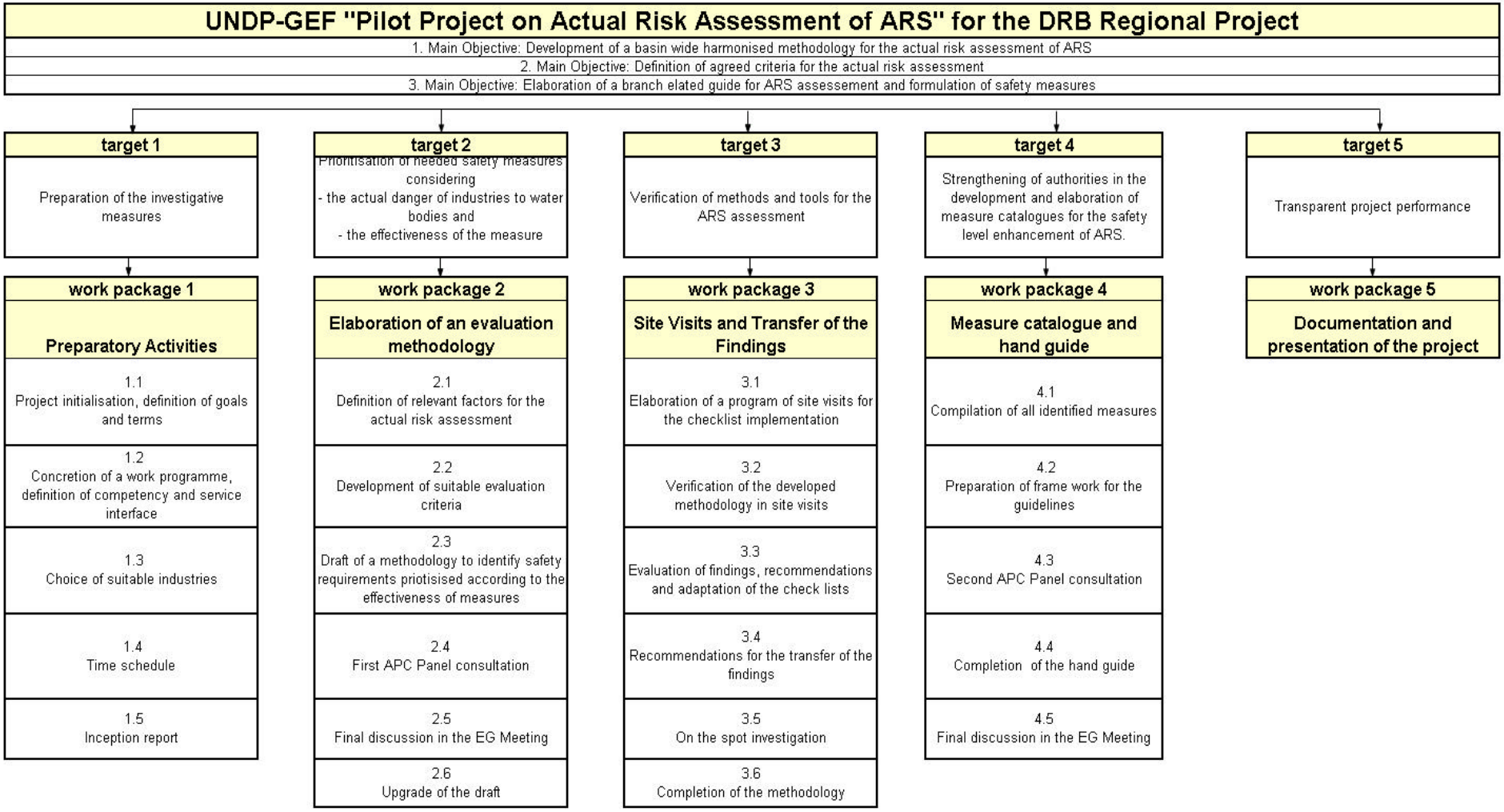


Figure 1: Structure of the proposed pilot project

Annex 11

Pilot studies on Know How Transfer for the Safety Measures of CS

Pilot Project: Contaminated Sites in Potentially Flooded Areas

Pilot Project for CS in Potentially Flooded Areas

Outcomes of the Project

- Ranking of potentially contaminated sites in the Danube region
- Recommendation on Safety Requirements on OCS in potentially flooded areas
- Checklist for the investigation of contaminated sites in flooded areas
- Site visit at Copsa Mica, Romania
- Proposal for a Pilot Project

28th Meeting of the APC EG in Ljubljana, September 8-10th

Finding of the site visit

- Adaptation of the recommendation
- Adaptation of the checklist
- Need of further developing the checklist
- Need of training and know how for managing old contaminated sites
- Need of further measures at the sites

Pilot Project for CS in Potentially Flooded Areas

Pilot project on know how transfer for safety measures at OCS

Objective

•To enhance the experience of the responsible authorities to improve the safety level of old contaminated sites in potentially flooded areas

•To use a pilot site as training site to

- implement exemplary site investigations
- develop a measure plan
- implement exemplary measures

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Which Pilot Site ?

- An an exemplary site, where several hot spots occur and different services for the investigation or the treatment of those hot spots are needed
- A site with high suspected risk
- A site where accession and investigation rights are guaranteed

Pilot Project for CS in Potentially Flooded Areas

Content of the Project

1. Training of country expert at an exemplary site:
   - Preparatory measures
   - Site investigations
   - Measure development
   - Exemplary implementation
   - Monitoring and site surveillance

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Content of the Project

2. Adaptation of the Checklists
3. Preparation of an agreed guideline for country experts
4. Multiplication of the findings

Estimated costs: 200.000-230.000

Pilot Project for CS in Potentially Flooded Areas

Conclusion

Due to the need of know how in concerning the treatment of old contaminated sites we would recommend to implement a pilot project for the know how and technology transfer for further investigations and safety measures at an old contaminated site.

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