

UNDP/GEF Danube Regional Project

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

Final Report

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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.

Table of contents

<u>Acknowledgement</u>	5
<u>Preface</u>	7
<u>Table of contents</u>	9
<u>Abbreviations</u>	11
1 Executive Summary.....	13
2 Background	15
3 Part A: Project Activity 2.3-3	16
3.1 Objective of the ARS Inventory.....	16
3.2 Description of the Methodology.....	16
3.3 Results	17
3.4 Conclusions and Recommendations for Further Investigations on Actual Risk Assessment	18
3.5 Further Steps	18
4 Part B: Completing and Prioritisation of the Inventory of Old Contaminated Sites in Potentially Flooded Areas in the Danube River Basin (Activity 2.3-2)	20
4.1 Objectives and Milestones of the Work Program.....	20
4.1.1 Inventory and Screening of Contaminated Sites	21
4.1.2 Recommendation on Safety Requirements for Contaminated Sites and Checklist Methodology	21
4.1.3 Milestones of the Work Program:	22
4.2 Inventory of Contaminated Sites	22
4.2.1 Proceeding of the Data Record	22
4.2.2 Identified Problems and Solutions	23
4.2.3 Results of the Pre Assessment of Suspected Contaminated Sites according to the m1-Methodology	25
4.2.4 Recommendations for the m1-Methodology	28
4.2.5 Conclusion for the further use of Pre Assessment Tools	28

4.3	2nd Meeting of the Small APC Working Group on Inventories	29
4.3.1	Visit of Contaminated Sites in Copsa Mica.....	29
4.3.2	Visit of a Contaminated Site in Hunedoara	33
4.3.3	Safety Recommendation and Measure Catalogue	33
4.3.4	Checklist for the investigation and risk assessment of contaminated sites in flood risk areas.....	33
4.3.5	Conclusions and Further Proceeding	34
5	Final Presentation of the Products at the APC Expert Group Meeting.....	34
5.1	Ranking List of Contaminated Sites	34
5.2	Recommendation on Safety Requirements for Contaminated Sites in Flood Risk Areas.....	35
5.3	Checklists for the Investigation and Assessment of Contaminated Sites.....	35
5.4	Proposal for a Pilot Project for Further Investigations and Safety Measures at Contaminated Sites.....	36
5.5	Pilot Project on Actual Risk Assessment of ARS	36
6	Further Steps.....	37
Annex 1	National Inventory of February 2003	
Annex 2	Results of the inventory end of May 2003/ Additional or modified lists of CS	
Annex 3	Results of the ranking of CS in flood risk areas with regard to their toxic potential	
Annex 4	Results of the ARS inventory of Austria in 2003	
Annex 5	Results of the ARS inventory of Bosnia in 2003	
Annex 6	Recommendation on Safety Requirements for Contaminated Sites in Flood Risk Areas	
Annex 7:	Draft Check Lists for the Investigation and Risk Assessment of Contaminated Sites in Flood Risk Areas	
Annex 8	Methodology for the Pre -Assessment of Suspected Contaminated Sites in Flood Risk Areas in the Danube River Basin	
Annex 9:	Photo Documentation of the Visits in Copsa Mica and Hunedoara	
Annex 10:	Pilot Project on Actual Risk Assessment of ARS	
Annex 11:	Pilot studies on Know How Transfer for the Safety Measures of CS	

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 3equivalents) and calculated water risk indices. After the upgrade of the ARS inventory in 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 $WRI \leq 5$ 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:

$$WR_{AI} = \text{Log} [WRC3 * (1 - F_S) * (1 - F_T) * (1 - F_I) / S]$$

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.

F_T 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.

F_I 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)**

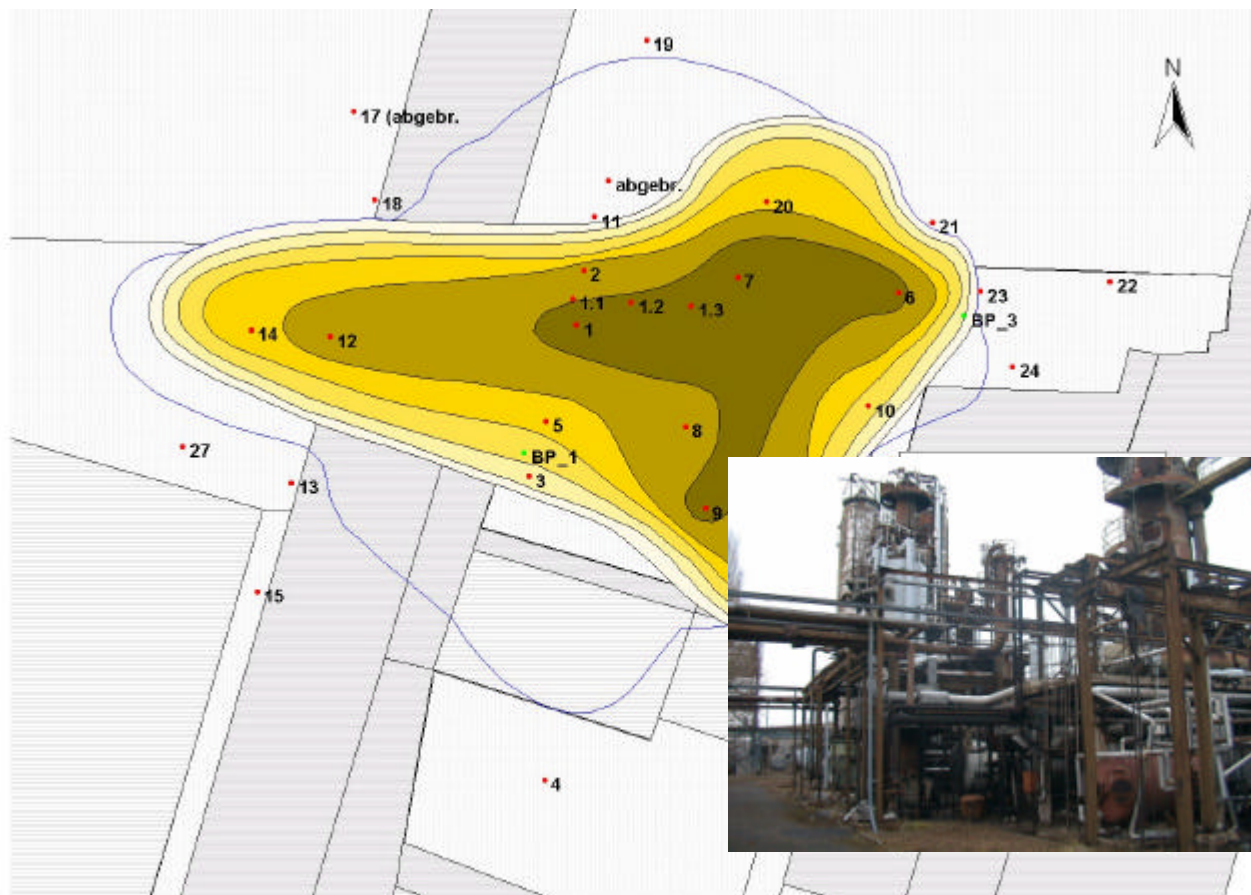


Figure 1: Oil contamination in an industrial area

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 implementation 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 27 th 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 Checklist for the Investigation and Risk Assessment of Contaminated Sites in Flood Risk Areas	Draft discussed in the Small expert group meeting in July Draft of the checklists were discussed after site visit in Copsa Mica
Presentation and adoption of the recommendation and checklist drafts at the 28 th APC meeting	Done in September, 8-9 th 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 m²
- old deposits with a contaminated volume smaller than 100.000 m³
- 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 be 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.

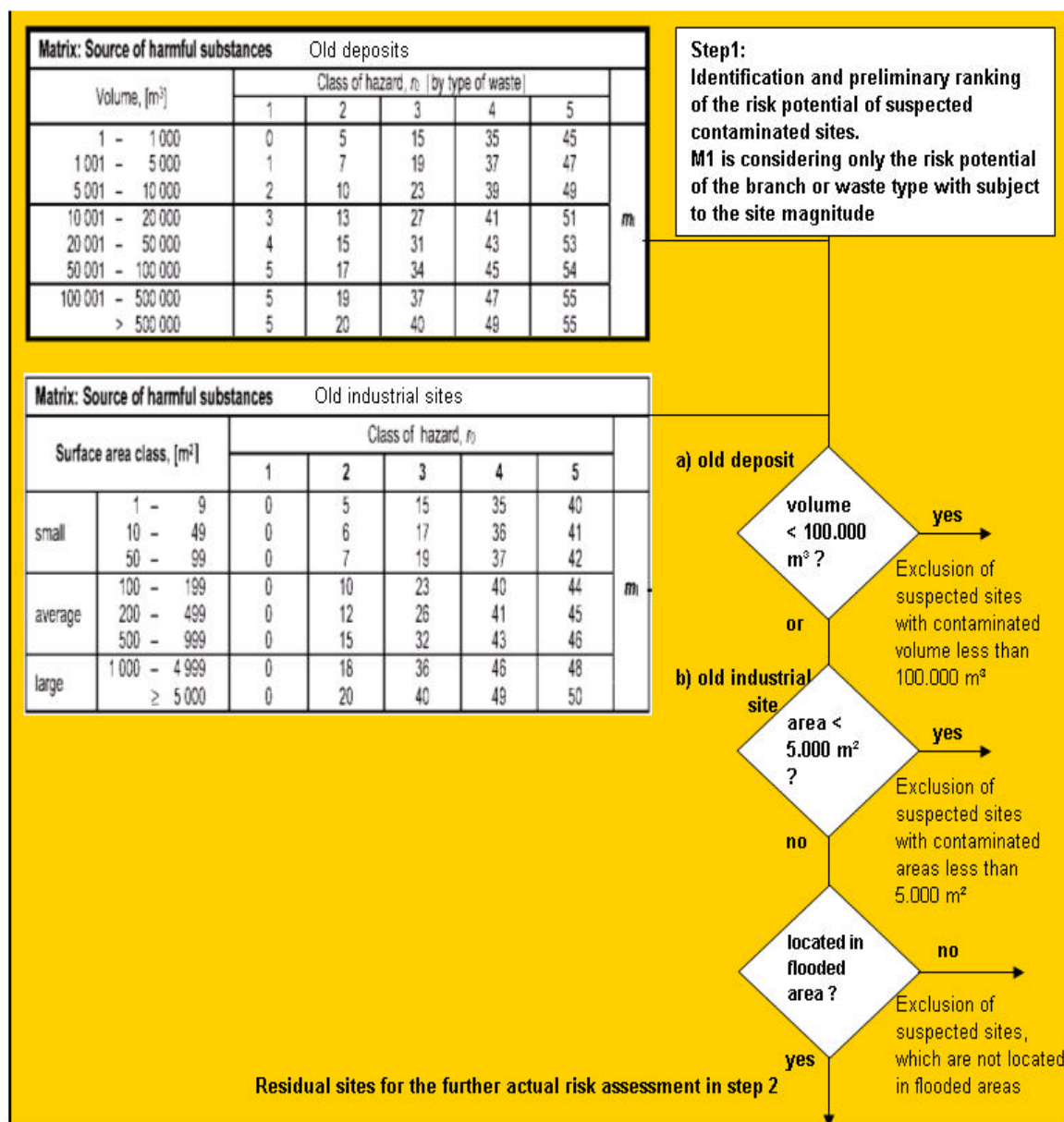


Figure 2: Illustration of the first step of the risk assessment

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 m ³	67**
Sites with area >5,000m ³	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 volume of higher than 100.000 m ³	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.

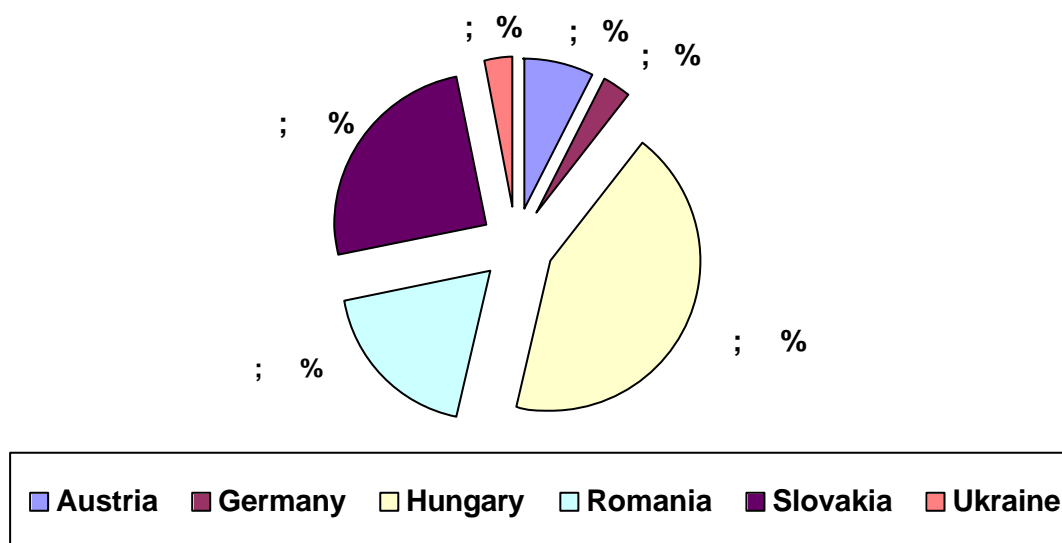


Figure 3: Listed sites with a contaminated volume higher than 100.000 m³

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 $m1 \geq 47$

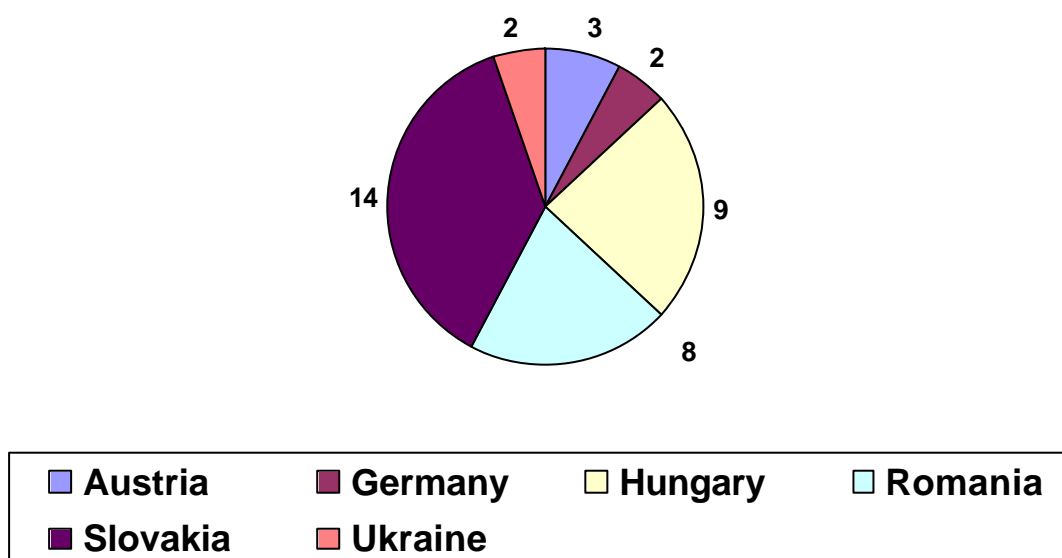


Figure 4: Listed sites with a high risk value $m1 \geq 47$

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 “m₁-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).

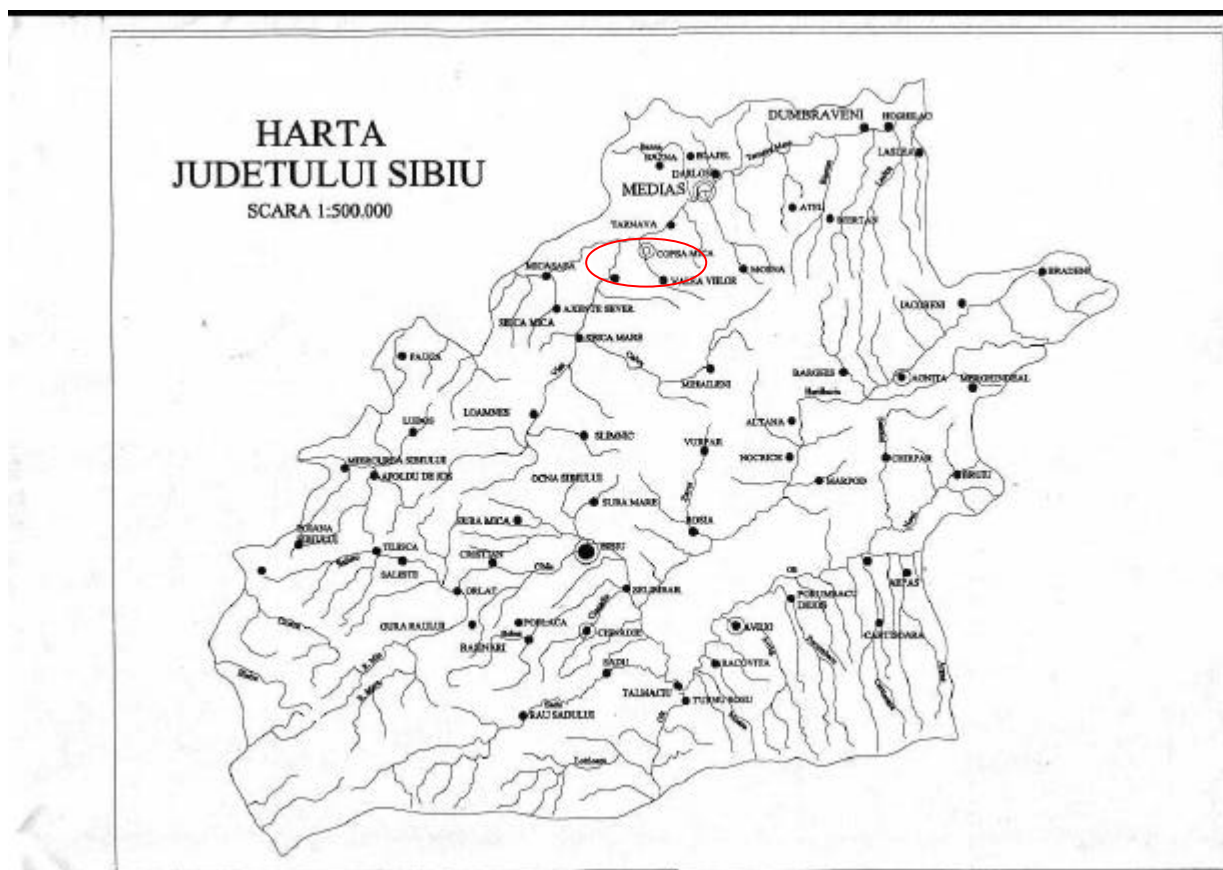


Figure 5: Map of the Sibiu Region

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.

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 2

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

Annex 3

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

Annex 4

Results of the ARS inventory of Austria in 2003

Annex 5

Results of the ARS inventory of Bosnia in 2003

Annex 6

Recommendation on Safety Requirements for Contaminated Sites in Flood Risk Areas

Annex 7

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

Annex 8

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

Annex 9

Photo Documentation of the Visits in Copsa Mica and Hunedoara

Annex 10

Pilot Project on Actual Risk Assessment of ARS

Annex 11

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