

REMARKS ON THE SLOVAK COUNTER MEMORIAL (SCM)**by Zoltán Simonffy****GENERALITIES**

I have looked over the chapters VII. and VIII. especially sections related to subsurface waters. Besides the remarks on the slovak memorial I have tried to draw up a form for the short overview of the problems, of the background and the uncertainty of the knowledge, of the agreement and the divergence of opinions of both parties. I think it would be more efficient to carry out the evaluation in that way (a series of remarks on the slovak statements would conserve the scattered character of SCM).

It was quite difficult to follow the SCM. The same subjects are touched in several sections of the SCM. A lot of quotation and reference make more difficult the evaluation. Sometimes the quotations do not reflect the more complex opinion of the authors. Even if it is an exaggeration, the SCM seems a linking text for the quotation: the quotation usually does not serve for supporting a logical series of problem-oriented statements but it seems more important to mention it because of its favourable content.

This approach is not favourable in case of a very complex problem where the level of knowledge changes considerably in time and there are not unambiguous, already accepted professional opinion for the problem. "Professional" means not only hydraulics or hydrology but all the profession concerned. The uncertainty in the hungarian opinion - as it is stated several times in SCM - is not necessarily a disadvantage. It is more close to the reality that the insufficient knowledge and the lack of the social agreement causes an uncertainty in technical decisions if the environment is highly concerned. On the other hand it is clear that the politics have influenced the professional opinion in both country: in Slovakia to find arguments for the original project and in Hungary, contrary, against it. From professional point of view the actual level of the knowledge is the most important, a previously stated contrary opinion is not already very interesting if the available information does not support it.

In legal sense obviously it is more complicated. From this point of view the situation between 1977 and 1989, in 1989, in 1992 and the actual one is to be separated: what was the background of knowledge of the different decisions. It would be interesting to know whether any difference exists in legal sense between cases when the supposition proves to be true or false if it can be proved that at the moment of the supposition information was insufficient for adequate answer or solution.

Considering the above situation I propose to summarize the problems in a problem oriented form.

This type of summary could help to make more clear the opinions and what the most important questions are. The actual mass of statements and contrary statements and references are difficult to follow and for non professional persons it should be even more chaotic. The proposed form of evaluation can simplify the discussion and it can be certainly sympathetic for the court.

REMARKS ON CHAPTERS VII. AND VIII. OF SCM

- 7.01. and 7.02. It is true that the Hungarian suspension and later the termination of the project have not been based on detailed new scientific analysis. We can say that Hungary has found the environmental problems to be not carefully studied. Precautionary principle!. It is really a problem that Hungary did not start new research program immediately after the suspension.
- 7.02. and 7.12. I must read the Ecologia report, the Hardi report and the Bechtel report in order to reflect on these paragraphs, and on others where these reports are referred. I have not had enough time.
About these reports: That is one of the reasons to propose the problem oriented summary of the situation instead of a lot of quotations. I think the slovakians have more possibilities to find favourable quotations. That is why I propose for rule of the summary that statements of other reports based on the same amount of information without any new data processing or calculation can not be used as a proof.
- 7.05. Chapter IV., without details: What does an Environmental Impact Assessment mean now and what do the referred reports cover of that. If that is not analyzed in the Counter Memorial it could be done in that phase.
- 7.13. See remark on paragraphs 7.01.
- 7.14. - 7.15. It is true that in Hungary two quite different opinions - sometimes too extreme in both sides - take place about the impact of the GN-project. The proposed evaluation can help to eliminate the emphasis on this disagreement.
- 7.16. -7.20. See remark on 7.02-7.12.
- 7.22. The improvement of the water quality in the side arm system is likely only if the discharge is big enough to decrease the residence time - it was quite long in the pre-dam situation after the closure of the upper part of the side arms.
- 7.24. - 7.25. Theoretically in Szigetköz bank-filtered water resources exist also. It is not yet exploited, but potentially it is possible. Bank-filtration: the majority of the abstracted water comes from the river within a short travel time (2 years). Possible bank-filtered well field will be analyzed in the frame of the KHVM-project.
- 7.27. What does "gradually being accepted" mean - see also the problem of paragraph 7.05.
The project is unique from the point of view of the side arm system and the extent of the corresponding recharge system. In that sense the following statement of the footnote no. 38 "72.5 % of the discharge at Bratislava is used for electricity production" has no base of comparison.

- 7.28. The convenient recharge system depends on the goal. It is not yet clear. On the other hand we would have to know more about the operation of the slovak side arm system and its impact: data on the operation, ground water levels and quality, time and place of the measurements and samples etc.
- 7.29. It is often used "no evidence", which means an uncertainty - it can not be accepted as a denial of an other uncertainty (the Hungarian claim), without data or convincing forecast it is maximum an other opinion.
- Are the commission of dames so frequent still now (hundreds each year)? (Dr. Kern?). On the other hand the construction and not the commission is important.
- 7.31. - 7.38. Surface water quality...
- 7.39. Even in the pre-dam situation the water was stagnant and of poor quality, the flood plain was not a recharge area, so there was not threat by spreading of the poor quality water.
- 7.40. It should be summarized that the causes of the clogging are: sedimentation and fine material in the deposited sediment, longterm one-way seepage i.e. infiltration from the river to the groundwater, vegetation in the river bed can intensify the clogging.
In the old Danube without underwater weirs the sedimentation and the clogging is not expected, except the last 5 km influenced by the original Danube water level downstream of Sap.
- 7.41. It would be interesting to see the references of the studies of independent expert on the sedimentation.
- 7.42. The deposition of the sediment and the clogging are two different processes. By increasing discharge only the deposited sediment can be removed. To make moving the clogged river bed a much higher velocity is needed or mechanical removal should be carried out (by raking for example). The clogging is a quick process so the washing out of the sedimentation should be carried out quite often, but without further investigation I don't know the precise answer.
- About slovak data two facts should be considered: (1) the sediment content of the water used for the recharge system is very low because it is originated from the bypass canal), (2) where the groundwater samples are coming from? N.b.: I would like to see measurements made after the flood of april 1994 when the water of high sediment content filled up the recharge system.
- However it is certainly possible the planning of an efficient and environmentally accepted operation of the recharge system but the details are not yet worked out.
There is nothing in SCM about the clogging of the reservoir and its impact.

- 7.43. Without the declared goal of the recharge system it is difficult to talk about the necessary discharge. A range of 30 - 70 m³/s is proposed by ECWG as a scenario and not as a required solution.
- It would be useful to give an overview based on the above mentioned evaluation form, but I am afraid that the time is too short for that. However the results of a numerical analysis of the observed data in Hungary (part of the starting project) will be available in April.
- 7.44. The 0.3 million m³/day will be specified in the frame of KHVM project.
- 7.46. About the unexploited Szigetköz aquifer, it was not a successful sentence in the Hungarian memorial. Nevertheless the protection of water resources is a task of the protection of environment independently of the plans for exploitation.
- I don't understand the linking between Szigetköz and Budapest, if it is mentioned in the Hungarian memorial, it is also not an efficient argument.
- 7.48. The planned situation could not be monitored and this is the problem.
- 7.52. The quality of the recharge to the aquifer depends on the quality of the sediments too.
- 7.53. The results depend largely on the place of sampling.
- 7.54. Data, time, place and component - that would be a proof.
- 7.55. It is true that usually heavy metals do not spread in the ground water because of the high adsorption capacity. But the adsorption capacity depends on the oxidative/reductive conditions - what references can be found for the investigation of the problem? Likely the ground water contamination by heavy metals is really not a serious problem but the accumulation of hazardous materials in the sediment has been observed in several reservoir - the dumping of this material which is mentioned under the footnote no. 84 would be a problem if we take seriously the environmental protection.
- The iron and the manganese is also not a serious problem, it is only a negative factor in the budget because of the necessary water treatment
- 7.56. The different recharge systems have not been investigated yet so any statement about the contribution of the waters from different origins is a supposition.
- 7.57. It is true that the side arm system in the pre-dam situation was not an infiltration area, maybe even not under natural conditions.
- 7.58. It is also true that the water quality of the infiltrating water depends

mostly from the conditions in the deposited sediments and not on the surface water quality. The reductive situation is a function of the organic content and it is more likely to find high organic content in the sediment if in the surface water the algae content is also high.

A summary of the available hungarian quality data, together with the corresponding hydraulic situation would be useful (Dr. László).

The EC WG writes only about the washing out of deposited fine sediment and not about clogged river bed. On the other hand the decrease of the ground water level and the retention of this level can happen with low infiltration rate also.

- 7.61. Is any possibility to ask the Slovakian Data Report?
- 7.62. Without data and the place of the samples I am skeptic about the statement "no evidence of pollution of sediments".
- 7.63. Mosoni-Danube discharge?
- 7.64. To prove this statement samples very close to the reservoir can be considered only, especially we are interested to the stagnant part of the reservoir close to the old Danube branch.
- 7.66. The water exfiltrating from the reservoir can be reductive and if this statement is a vague possibility it should be considered.
- Downstream of Nagymaros, sections affected by erosion and deposition would alternate according to the modelling results. The surface water level is determined mostly by the erosion. More information can be obtained by continuing the modelling (Dr. Bakonyi's team). The report of VITUKI predicts a decrease of bank-filtered well capacity of approximately 1,5 % by each 10 cm of surface water level decrease.
- The deposition of the washed out sediment of the reservoir can produce local problems - examples are given in Dr. László's report. The elimination of the deposition or the mixing of the waters of different wells can be a solution.
- 7.67. We have already the report of VITUKI (by F. László and J. Maginecz) but it is quite far a way from a scientific basis.
- 7.68. It is true.
- 7.69. - 7.71. Without new research the threat for bank filtered water resources cannot be supported.
- 7.72. The higher surface water level increases the contribution of the river water of good quality in the abstracted water comparing to the part of bed quality water from the background area. But there are two conditions: the water quality in the deposited sediment should be the same as it is now, and there is no significant changes in the river bed resistance due to

sedimentation and clogging.

- 7.73. The methodology of this Environmental Impact Assessment is weak. Based on the problem-oriented evaluation the necessary content of an appropriate EIA can be determined.
- 7.75. The statement of the EIA on the Szigetköz aquifer simplify the problem.
- 7.76. It is mentioned also "This section .. will get more susceptible to sedimentation. ... the growing pressure due to the permanently high water levels will be enough to compensate the growing resistance due to the sedimentation and the clogging. In case of need this unfavourable effect can be reduced by dredging."
- 7.77. I would like to read the paper of prof. V. Nagy. Annex 20. of the SCM.
- 7.81. The dredging downstream of Bratislava has played an important role in the erosion of the river bed and as a consequence in the drop of ground water level.
- 7.82. 20 days for receiving fresh water seems small, it is to be checked!
- Generally. It is clear that before the damming the situation was not natural. The main question is : what is the major aim of the project. The navigation and the flood control would permit a much higher discharge in the old Danube. The only real reason of the Slovakian opposition against the higher discharge is the energy production.
- 7.86. The value of 6,000 and 23,000 ha in the pre-dam situation seems correct.
- 7.87. What kind of impact? If we talk about the unfavourable ground water drop it largely depends on the recharge system. The recharge system proposed by Slovakia has not been investigated, so it is difficult to talk about intended impact. If we talk about favourable impact it is better that the impact area is the whole flood plain.
- 7.97. The value of 107,000 ha is really exaggerated. Our evaluation presented in the counter memorial shows a much smaller value.
- 7.98. It would be interesting to see an evaluation of the vegetation of the Slovakian floodplain.
- 7.99. Fluctuation could occur also in the case when the side arm system does not receive water from the upper part of the branches.
- 8.03. How many water is needed for the image of Dr. Jaeggi. Water levels, discharge, velocities?
- 8.06. - 8.10. These statements are correct.
- 8.11. It is true, but the main point that really Hungary has no control on the

discharge in the Danube. We can not decide about the operation of the recharge system because the availability of the necessary discharge is under the control of Slovakia. There was already several judgements from the Slovakian part about Hungarian claims to increase the discharge: Hungary don't need more water, the same system as in Slovakia should be established.

- 8.11. - 8.12. No comment.
- 8.14. - 8.20. The WWF-Mucha debate seems a pseudo-debate. The efficient way to make the kind of quotation is the scientific evaluation of the problem without quotations of non important papers and studies.
- 8.21. The ECWG's statement is based on available data. In their report of Nov. 2. 1993, the ECWG mentions also that " The present monitoring of ground water quality appears adequate. However, because of the relatively slow ground water transport process, it should be emphasized that the intensive monitoring must continue or coming years, especially with regard to areas close to the Danube.... Thus it can not be guaranteed that a permanent situation, whether changed or unchanged as compared to pre-dam conditions, is obtained all over the area the first few years."
- Water and sediment analysis. The places of the samples are very important. To talk about the lack of accumulation after one and half year is a little bit rash.
- 8.25. The fig. CM-13 of SCM shows the differences in water level between before and after the damming. It is not clear what is the base of the comparison. By the way it is interesting why in the slovak side the decline of the water level is less then in Hungary even before the implementation of the recharge system. The hungarian part of the figure CM-13 will be verified by VITUKI in the frame of the new commission of the Ministry.
- 8.26. The fluctuation of the ground water level does not come back with the implementation of the planned recharge system if in the Danube the discharge remains 200 m³/s. I am not agree with the statement of ECWG on the fluctuation.
- The lack of sedimentation is also a function of the sediment content of the water and of the velocities. The ECWG gives limit values for velocities: 0.6 m/s 7 cm above the bottom which require 0.9 m/s cross-sectional average, to remove the fine sediment 0.2 - 0.4 m/s, to eliminate the deposition 0.1 - 0.3 m/s velocity is needed.
- 8.29. - 8.31 ECWG has mentioned a range of 30-70 m³/sec discharge and that is also to be discussed.
- 8.36. Just after the flood deposition of the high sediment content can be expected in the side arm system. In the old Danube it depends on the discharge. Actually there is not 400 m³/s discharge offered by Slovakia

for the old river bed, even not in average.

The ECWG is critical in point of view ecology and forestry. It would be useful to prepare a summary of the evaluation of different scenarios proposed by ECWG.

REMARKS ON THE SLOVAK REPLY

by Zoltán Simonffy

GENERAL REMARKS

There are three major arguments in the Slovak material:

- instead of uncertainty analysis and simulation the real data from the monitoring of Variant C should be analysed,
- the Original Project should be considered together with subsequently planned remedial measures,
- the majority of the problem would not exist if Hungary implemented the necessary measures: increase of discharge in the side arms and construction of underwater weirs.

About monitoring - simulation:

Question of methodology: simulation based on reliable model can eliminate the often occurred problem in case of evaluation of complex systems based on real data, namely the impact of different factors can not be separated. In case of planned but not yet realised project only the simulation and the so called prediction can be an appropriate method. The real data can and have to be considered during the calibration procedure.

Slovakia also accepted this principle by implementing a huge PHARE project. But they decided about the construction of Variant C before having the results.

It is also a methodological principle that phenomena can be analysed only based on data fitting to the changes of the processes in time and in space. For example the spreading of pollution characterised by a velocity of less than 100 m/year can not be analysed two years later from the start at a distance of more than 1 km.

Analysis based on real data requires an appropriate monitoring system, the actual monitoring system should be checked from that point of view.

The monitoring is for the detection and the control of predicted risks and not for replace the preliminary risk assessment. Furthermore the results of a preliminary risk assessment should be used for the appropriate design of the monitoring system. In case of small projects the necessary remedial measures can be more easily fitted to the measurements or even the elimination of the given feature is feasible. But in case of large projects we have to know more about risks. If risks - according to the given level of the knowledge - are accepted the monitoring network should be designed according to the predicted danger. To observe a given monitoring system and to check whether a harmful impact occur is a quite passive way of operation. I do not want to say that the Slovak monitoring completely ignore this principle but it seems a little bit weak from the groundwater quality point of view.

We should check it. One possibility would be to establish a list of potential problems (the start would be my list of problems given during the evaluation of Slovak C-M) and to ask Slovakia to give the corresponding objects of the monitoring system and the list of the available data. But this operation probably do not need a further "written" phase can be managed in the "verbal" phase.(?)

About "Original Project"

This is mostly legal question. This kind of assessment can provide information if the Court wants to compare the impact of the G/N Project in different stage. On the other hand a further sensitivity analysis or preliminary impact assessment can justify the filling on the risk even if it was not proved by evaluation at the given time.

To support the basic data of Hungarian evaluation in the C-M a short summary would be helpful, showing the different stages of the project development about considered remedial measures.

About remedial measures

This problem has been handled in the Hungarian Reply in detailed. My personnel opinion is that the design of an efficient recharge system is certainly possible from technical point of view but considering the complexity it needs detailed investigations, monitoring, gradual realisation and careful operation.

DETAILED REMARKS**Volume 1.****Chapter I.****Section 2.**

- 1.13. The existing risk related to the groundwater quality is also proved by data: for example in case of groundwater quality data from the vicinity of side arm systems, data show reductive situation in several sites (on the other hand it is true that the mixing of water originated from different sections is uncertain, but the risk is demonstrated.)
- 1.14. See general remark on the "real data - monitoring" problem.
- On the other hand in the Hungarian C-M only the impact of the "Original Project" has been investigated by simulations using models. The impact of Variant C has been evaluated based on measured data.
- 1.15. See also general remark on the monitoring system.
- 1.19. The colour plates on groundwater levels before and after the implementation of Variant C are based on measured data. The Slovakian version of the map is criticised in the Hungarian Reply.
- 1.20. From technical point of view, decision should be based always on the most recent information. Obviously decisions should not be suspended and cancelled for longterm because of the possibility of future occurrence of new facts but the safety and the acceptable lack of knowledge are highly related to the risk. Was any proposal from the Hungarian side for common EIA in 1989. If yes, did Czechoslovakia refuse it? Hungary refused the participation in the PHARE project, was it explained in HM or H C-M?

Chapter II.-X.

not analysed

Chapter XI.**Section 1.**

- 11.05. Concerning the relationship between preliminary risk assessment, monitoring and decision the underwater weir can be presented as an example. Considering the fact that the most cheapest and actually feasible way to provide more water to the side arm system is the underwater weir, the construction was decided based on the available information. The related risk is not very high because even if there is some deterioration of the quality of groundwater - it can be controlled by the appropriate monitoring network, installed close to the Danube river bed and the already drilled group of wells close to side branches - the velocity of the spreading should be low. The underwater weir is a temporary feature thus it can be destroyed in case of serious quality problem.
- 11.06. The principle that if there is not any changes in short term, it will probably not significant changes in the future is O.K., but not only the time but the appropriate distance is also important.

Section 2.

- 11.10. The SR accuses Hungary to consider the results of new evaluation but it wants to consider the favourable impact of "remedial measures that developed subsequently". The quoted values are correct if we consider the situation of 1989 as a base. Further remedial measures and the Variant C should be evaluated separately. (See also 11.15)

Section 3.

- 11.16. The major difference between Original Project and Variant C is not in their impact on the environment but in the possibility for Hungary to control the system. The decision on the modification of the operation of the system is out of Hungarian possibilities. Hungary can not decide that for example it increases the discharge of the old Danube in charge of the energy production.
- 11.18. The results of an impact assessment of Variant C depend on the available information. It is to be checked, see proposal among general remarks.
- 11.19. The doubt about the value of the Slovakian monitoring system can be repeated. The misunderstanding of the role of the monitoring system continues: see para. 11.05. I have not information whether the actually existing monitoring system differs from the planned one for the original project. Anyhow the actually existing monitoring system can be evaluated by checking the problem oriented design. (?) The huge amount of data are not enough moreover it indicates a low efficiency.

Chapter XII.**Section 1.**

- 12.03. The capacity of the bankfiltered wells will decrease because of the lowering of the surface water level due to the potential erosion of river bed and it is not related to good or bad placement of wells.
- 12.04. Ferenc László should be asked to comment this paragraph.
- 12.05. These examples have sense only in context of possible erosion. If fine sediment is washed out from the reservoir in an uncontrolled way, it can be deposited in the eroded part of the river bed causing similar quality problems to the quoted cases.

It is mentioned in the VITUKI report dealing with the impact of the Nagymaros Dam on the bankfiltered water resources that VITUKI Consult predicted a river bed erosion of 10 - 17 mm/year. This is also uncertain. In the report of VITUKI we investigated the impact of the decline of Danube water level of 30 - 100 cm. The minimum corresponds to an erosion after 30 years with minimum erosion rate or 30 years while the maximum can occur in 60 years if the maximum erosion rate is considered. The decrease of capacity in case of 1m lowering is 15 %. The "serious risk" is really an exaggeration of the problem.

- 12.08. The chapter is dealing with water resources but there are no words or reflection on the changes of the available recharge. The main professional question whether the reservoir and the side arms can replace the formerly infiltrated amount of Danube water?

From the quantitative protection point of view not only the water levels but the recharge is

also to be maintained. There is nothing about clogging. The actual recharge from the reservoir and from the side arms can decrease in the future. The qualitative protection is a further task.

- 12.12. International experience and professional fact that in reservoirs sedimentation occur. If the organic content of this deposited material is high, reducing condition occurs. The "recent sensitivity analysis" mean geochemical modeling. The amounts are uncertain but in spite of that it is likely that reducing condition will occur. Obviously it is not the same for the whole reservoir area, the interesting areas are with low velocity.
- 12.13. Sampling sites of the monitoring? Comparison of Slovak data with the values applied for the estimation of dissolved Fe-content.
- 12.14. The decrease of nitrate is expected. If it is due to denitrification it indicate reductive situation: what about dissolved O, Fe, Mn, NH₄ etc.
- 12.15. In the historical situation there was not main channel, but there was not any side arm having important drainage impact on the neighboring area as now the old river bed is.
- 12.16. Plate 8.a. water level drops are deceptive?
- 12.17. The decrease of groundwater level is "due to the reduction of the flow in the old Danube" maybe the situation can be improved by artificial recharge from side arms. This problem is handled in the Hungarian Reply.
- 12.21. In footnote 60.: "Slovakia naturally[sic] aims to maximize electricity production" - it is clear, on the other hand they declare that because Hungary has not share in the electricity production the decision about increased discharge in the old river is not a "self-imposed decision". Hungary is also limited by Slovakia by the claim that more than 400 m³/sec discharge in the Danube can lead to eutrophication problems in the reservoir.
- 12.22. Slovakian data on the operation of the side arms ...?
- 12.23. Plate 6.a.: The plate 6.a show further decrease due to pessimistic clogging. this area is only really 130 km².
- 12.24. The difference is in the direction of flow and not in the fact that in pre-dam condition reductive situation already existed.

The site of the Hungarian well groups are selected taking in the consideration of the representativity: Slovaks have also doubt on Hungarian data.

Volume II.

Slovak Comments on the Hungarian Scientific Evaluation

Chapter 3. Surface and Groundwater

General remark: There is no serious concrete critique of this chapter. The comments are usually general, the three arguments (mentioned in the beginning) are repeated several times. However I have tried to give some more detailed remarks on the Slovak comments.

25/(4): With regards to the quantitative protection of groundwater resources the amount of the recharge is the major question.

26/(5): see also remark on para. 12.23.

26/(6): A likely degradation of Karst water was not mentioned in the VITUKI report.

26/(7): HC-M mentioned organic matter and not organic micropollutant, monitoring data?

26/(8): Sampling sites of the Slovak monitoring to control the impact of the recharge is to be checked in Volume III or by asking further information.

27/(9): See general remarks on the recharge system.

27/(10): F. László?

27/(11): VITUKI report did no predicted **serious** risk: see remark on para. 12.05.

27/(12): The drainage condition is also a relationship between surface and groundwater. In case of the operation of Nagymaros dam this interrelationship will be inverse, recharge conditions will occur.

pp. 29-36 not checked!

37/(1): The quotation does not deal with quality.

37/(2): Again, the comments does not correspond to the quotation.

37/(4): The problem of meaning of "Original Project"

37/(5): There is nothing in the text about the clogging of the main channel.

38/(6): Plastic sheeting means 0 leakage, from qualitative point of view it is protective but this paragraph of HC-M does not deal with qualitative problems.

38/(7): It is recognized in the last paragraph that with lower Danube level there is a general decrease of the utilizable recharge. It should be the same in case of the actual more important decrease of Danube water level. The major question is how can it be replaced by recharge from the reservoir and from side arm system.

39/(1) It is clear that the Slovakian and the Hungarian situation was different: Hungary had not large area with important decrease of groundwater level thus this type of benefit of the project is

quite limited in the Hungarian territory.

- 39/(3): The Hungarian and the Slovakian image on adequate response is different. The assessment of the actual situation does not allow the prediction of the impact which does not yet exist. The underwater weir at Dunakiliti will allow the real and detailed assessment of the impact of the underwater weirs.
- 40/(1): The increase of the riverbed resistance can probably be compensated by the higher water level but the risk for reductive situation remains still a problem.
- 40/(3): The philosophy on aquifers is not so understandable.
- 41/(1): The changes in groundwater levels are already discussed in detail in the Hungarian Reply.
- 41/(2): Although the Danube Water has still high dissolved oxygen, it does not enter the aquifer.
- 41/(4): Problem oriented evaluation of the huge amount of data would be interesting.
- 43/(1): The data used for the estimation of VITUKI is to be compared with observed data.
- 43/(2): About anaerobic condition, comments of Vol. III. p. 15!
It is to be checked!
- 50/(3): The serious threat is really an exaggeration.

Annex in Volume II. about the Activity of the PHARE Project

- 4.7.1. Denitrification suggests reductive situation. Dissolution of Mn occurs.
- 4.10. 10/year sedimentation close to Rajka is simulated by MIKE21.
- 5.7.1. The approach is similar to that presented in Hungarian Scientific Evaluation. Slovakia did not wait the results of the project.

Volume III.

Summary: I have read chapters related to groundwater. I have not find very important new facts or detailed analysis which can considerably modify our arguments on uncertainty. This report is not so detailed than it can be considered as an indisputable prove. Moreover it supports the filling that the monitoring and its evaluation is not problem-oriented.

It would be interesting to give some emphasis on the difference in approach between DHI/VKI in Phare project and that of Slovak experts writing the Slovak Reply.

From professional point of view I would like to know more about the data but probably it is better to do it by personal communication in the frame of bilateral cooperation and do not include it in the legal proceedings. From legal point of view maybe it is better also do not go towards very detailed discussion on certain data. I think that the submitted Slovak material can be criticised at the Court from conceptional point of view. The maximum what I propose: to ask more information about the sites and the available data as I mentioned in the beginning of my comments. That would be also important in order to have more information before evaluating how the Slovak monitoring is appropriate and on the other hand do not have surprise during the following phases of the proceedings if Slovaks present a more detailed analysis of the available data.

Chapter 1

Sections 1. - 3. not checked

Section 4.

p. 6-7: The decrease of 1m of the groundwater level on the Slovakian side close to the Danube between 1840 and 1820 rkm is strange considering that the Danube water did not have a decreasing tendency at this section. This changes are not confirmed by presented time series. Exaggeration of the decrease for larger area than the reality? Fig. 7. and Fig. 8.

Section 5.

p.7.: The aim of the recharge system should include the increase of groundwater level and the increase of recharge. In the Slovak evaluation only the increased groundwater level is demonstrated for a period of a half year and there is no estimate about the recharge. On the other hand the evaluation of the impact of the recharge system and the maintenance of its capacity would require the analyses of more long time series and the time series of the reservoir too which is not mentioned. Fig. 9.

p.8.: The map on the figure 11. shows a decrease of greater than 1 m on a 1 km large strip along the Danube. Is it accepted by Slovakia? Construction of underwater weirs can solve the problem but imposes others, its potential impact on the sedimentation and the ecology is to be studied carefully. It is obvious that the project has favourable impact on the Slovakian part close to the reservoir. For Hungary mostly the decrease of the groundwater occur.

Section 6.

p.9.: There is nothing about the impact of the Variant C on the fluctuation or about applied solution (?) to compensate the lack of fluctuation.

Section 7.

p.12.: According to the figures 22. - 23. the lack of fluctuation has not to much impact on the relative position of fine covering layer and groundwater along the Danube. It is due to the fact that categories showing an alteration of the water table in the gravel and in the covering layer (yellow and light green on figure 22.) are insignificant(?) and more than 0.5 m increase of average groundwater level (figure 11.) occur in a quite large area along the bypass canal.

Section 8.

p.13.: The groundwater quality is influenced by much more factors than fertilizer and sulphate.

It is not clear what are really the wells of the monitoring of groundwater quality. 200 samples from observation wells in 1994 - where these wells are and what is their depth. 110 municipal production well observed regularly: that part is clearly object oriented monitoring network. What about pollution source oriented wells, close to the reservoir and the recharge system. Do they have wells in the vicinity of the side arms similar than in the Hungarian side?

p.16.: Rusovce: distance is 1 km from the reservoir. Depth?. Clear impact of the increasing amount from the Danube side. What would be the travel time from the reservoir to the well. Are observation wells closer to the Danube?

Kalinkovo. Phare project mention slight increase of organic material and Mn in the observation wells. The presented well is a production well. The depth of wells is also important because of the travel time.

Samorin and Gabcikovo: the distance from the reservoir is considerable.

Section 9.

Nothing among concluding remarks on the changes in recharge condition.

Chapter 2.

Section 1. - 2. not checked

Section 3.

It would be interesting to compare the measured data and the values considered by F. László for geochemical modelling.

	F. László	Slovak monitoring
Dissolved oxygen in reservoir water	10 mg/l	8.0 - 8.5 mg/l
Nitrate in reservoir water	10 mg/l	1.7 - 3.7 (Σ N)
BOD in reservoir water	2 mg/l	2.0 - 2.3 mg/l
Amount of deposited fine material	1 cm/year	2 - 10 cm/y
Biodegradable fraction of the above	0.5 %	2.7 - 9.0 %
average flux through the reservoir bed	0.1 m/d	?
water temperature	5-15 °C	
redox potential	0-50 mV	?
pH	6.5 - 7.5	?
HCO ₃	150 - 250 mg/l	?
SO ₄	25 - 35 mg/l	?
Cl	15 - 25 mg/l	?
Ca	30 - 70 mg/l	?
Mg	10 - 30 mg/l	?
Na	5 - 10 mg/l	?
K	2 - 6 mg/l	?

Except NO₃, the values found in the Slovak Reply correspond quite well to that used by F. László. A real comparison can be made if we have all necessary data and for different sampling sites.

It would be important to ask the opinion of Dr. László about quality problems.