

Examining magistrate no. : 06/6061, 07/1047, 08/3962, 08/3966, 08/3961, 08/4012
Public prosecutor's office no.: 13/846003-06, 13/994066-07, 13/846003-08, 13/846004-08, 13/846006-08,
13/846008-08

INVESTIGATION OF AN EXPERT WITNESS

On 21 September 2009 there appeared before Justice H.B. van Gijn, examining magistrate charged with hearing criminal cases at the District Court in Amsterdam, the following person:

- **F.J.M. Bakker**

In order to testify in the criminal proceedings against the following accused persons:

Name : **Trafigura Beheer B.V.**
City : **Amstelveen**
Address : **Van Heuven Goedhartlaan 937**

Name : **Uittenbosch**
First names : **Evert Martinus**
Date/place of birth : **02 May 1950 in Amsterdam**

Name : **Ahmed**
First names : **Naeem**
Date/place of birth : **02 April 1967 in Sheffield**

Name : **Chertov**
First names : **Sergiy**
Date/place of birth : **25 September 1963 in Abkhazia**

Name : **Amsterdam Port Services B.V.**
City : **Amsterdam**
Address : **Petroleumhavenweg 48**

Name : **Gemeente Amsterdam**
City : **Amsterdam**
Address : **Amstel 1**

The Examining Magistrate was assisted by the clerk of the court, C. van der Steen,

The expert witness stated that he would say the truth and nothing but the truth and that he will perform his task as expert in good faith.

The expert witness made a solemn affirmation thereto.

Present at the hearing were:

Counsels for the accused Trafigura Beheer B.V., lawyers A. Verbruggen and R. the Bree,
Counsels for the accused Uittenbosch and Amsterdam Port Services, lawyers V.A.M.G. of the Bilt and A.J.M. de Swart

Mr J. Langeveld on behalf of counsel for the accused Ahmed, Mrs M. Bakker

The public prosecutor, Mr L.W. Boogert

Counsel for the accused Chertov, lawyers A.E.M. Röttgering and E.A.M. Mannheims, and counsel for the accused Gemeente Amsterdam, lawyer P.M.L. Schmelzer, gave notice of absence.

The witness made the following statement:

My name is Fredericus Johannes Maria Bakker. I was born on the 17th of October 1956. I am a scientific examiner by profession. I choose domicile with the NFI in The Hague. None of the accused is related to me by blood or marriage.

Remark made by the Examining Magistrate:

When I forwarded the draft of the transcript of the investigation of 21 September 2009 I informed Mr Bakker that if he still had any remarks to make, he could let me know and that we would discuss these remarks at today's session. In response, Mr Bakker sent me a document containing a large number of additional remarks. These are points that were not stated by him in this manner. Prior to the second investigation of 2 February 2010 I had this document forwarded to the counsels and the public prosecutor. It was agreed that in order to improve the readability I would integrate the remarks in this transcript. The remarks are recognisable by being represented in italics and starting with the statement: "After having read".

With respect to the preparation

Further to questions from the Examining Magistrate:

What have you done in order to prepare yourself for this investigation?

I checked the file. I checked the reports.

What does your file contain? Is it what you have in front of you there?

No, I also brought two other binders. Three even.

And you checked them all?

Yes, I checked them all again.

Which documents have you checked?

I have checked all information in fact, of the entire case. The sample-taking, the analyses. I also checked them with my colleague who will be before the court tomorrow.

You mean Mr Peschier?

Yes, that is correct. I have made calculations, standard calculations. And I checked these again.

What have you discussed with Mr Peschier?

Because it has been two, three years since we carried out the investigation, it was necessary to recall the details, what we analysed and how we went about it and what the results were. And as regards the file, we received documents from the police and these contain facts. I tried to get things clear again.

Does your report mention all documents that you received for your file?

I think so. Information was exchanged. Because the course of events in the beginning of July 2006 was not entirely clear, we received a lot of information afterwards; not by official documents, via transcripts and such, but in emails we received from the police. Not all of these are referred to in the report.

And you read all those emails again as well?

No, because afterwards another report was published and that was forwarded to the police much later. By that time the transcripts were available and these transcripts do contain the facts that I mentioned in my earlier report. Therefore, these transcripts are included in my file; the second investigation. Of these I do have an overview.

I saw some of the emails. Do you still have all emails in your possession that were exchanged at the time, so that we also know what the earlier report was based on?

Most of them, yes.

Remark Examining Magistrate:

I think it is important to make it clear on what material the reports were based.

I therefore request the witness to forward to me any emails that include information and/or questions on which the reports were based.

Did you speak with anyone else besides Mr Peschier in preparation of this investigation?

There is someone at legal affairs with whom we discussed the procedure at the court. He read the documents and asked some questions about it. Simply in order to prepare for the case.

Is that some kind of training, so that you know what is expected of you?

Yes, and also to get some idea of the questions that might be asked.

Did you talk to anyone from the police?

No.

Did you talk to anyone else outside the NFI?

No.

Further to questions from counsel De Swart:

Did you read any reports of the meetings that had taken place?

Of meetings between you and the IMT and the Public Prosecutor's Office?

Yes.

Can you indicate how many of these reports you have read?

There is not a report of each meeting. Of some there are only some notes. If formal agreements were reached in a meeting, they were recorded. I checked all of those.

How were these agreements recorded?

I keep a log.

So if I understand you correctly, sometimes full reports were made of meetings, while of other meetings only notes were made and these you recorded in a log?

That is correct.

If notes were made, were they made by you?

Yes. After having read my statement I wish to remark that not only I, but everyone who at any time has information that may be relevant to the case (analysis results, telephone notes etc.) may (and sometimes must) record this in the log (progress). But in practice it was mainly Mr Peschier and I who did this.

Is that something else than the log?

There is one progress in which the telephone notes are recorded, results of meetings with people of the lab, in other words the entire progress of the investigation, the analysis instructions internally and externally. I think that a proper report was made of the meeting of 18 July. Of the other discussions it was recorded in the log.

Madam Examining Magistrate, in line with the above, could you request Mr Bakker to forward this log to you as well?

It is rather extensive, some 30 pages. I made a summary. I do not think it is common practice at the NFI to submit the entire log, including all loose remarks and notes.

Remark Examining Magistrate:

The public prosecutor objects, because he thinks it too expansive. I note that the underlying data that formed the basis of the investigation must be clear. This kind of information must be added. The same applies with direct requests from the Public Prosecutor's Office and of the police, in order to investigate certain matters. I tell the witness that naturally his report contains all kinds of research questions. If these offer a comprehensive view of the research questions, and it also covers the intermediary questions, there is no need to submit the entire log. But if the log also contains documents that include actual requests in the vein of: NFI, could you take a closer look at this matter, this will have to be submitted as well. It has to be properly clear what your client ultimately wanted of the witness, and how this was reflected in the investigation. Mr de Swart notes that the reports only contain the final questions and therefore do not reflect how these questions were phrased, what intermediate questions were asked.

Mr Verbruggen notes that the evolution of the questions is made visible in the questionnaires of most participants. In other words, this might mean that when the material is considered and studied this will be followed up with another brief investigation of Mr Bakker.

I request Mr Bakker to submit to me all documents that formed the basis of the report, including data and requests to examine certain matters and that are not already included in the previously mentioned documents, in order to enable me to decide which documents have to be added to the file. Whether I will also look at the log, I will decide after I have seen the other documents. It is possible that the witnesses will again be called, further to those documents, to answer questions further to them.

After reading the remark made by the Examining Magistrate that "It has to be properly clear what your client ultimately wanted of the witness" I made an overview of the research questions:

1st request July 2006
In your possession

Consultation 18 July 2006
In your possession

15 September 2006
Someone of the VROM Inspectorate asks for the euralcode of the Probo Koala slops.

18 September public prosecutor Spoor (by telephone)
She asks to determine whether the cargo of Martens VII contained any Probo Koala material.

21 September consultation with investigation team and public prosecutor Boogert (from progress)
Priority shifts towards:
Testing Marpol
Eural coding
Identification of the material
And Section 173 a/b criminal code

Less priority:
Additional measurements of compositions and on the basis of them comparison of DAF, Main VII and PK samples
Investigation related to the Martens VII

9 October 2006 consultation with investigation team + public prosecutor Boogert (from progress)
Research questions to be reported
Composition Probo Koala slops
Establishing whether PK material is present in Main VII, DAF, B2 and Martens VII
Origin Probo Koala slops (in the sense of how they were produced).
Eural classification and coding

Marpol testing

Health risks for staff and surrounding area due to treatment in the DAF

10 October 2006 Mr Kruithof (by telephone)

Request from P. Kruithof (member investigation team) whether it is possible to determine a dilution factor, based on the concentration ratio(s) of substances in the slops and in the DAF and by doing so establishing how much slops were treated in the DAF.

1 November 2006 consultation with P. Kruithof and J. vd Kamp

See email 2 November (enclosed as yet)

With respect to education and work experience

Further to questions from the Examining Magistrate:

What education did you have, in so far as is relevant to the case?

I studied chemical technology, and have a masters in chemistry. I also completed a post-doctoral study in toxicology.

Chemistry is rather a wide field. Did you specialise in any way?

Yes, environmental chemistry, which forms part of analytical chemistry, more or less.

Does that include both organic and inorganic chemistry?

Yes. I did not really specialise in either. It is possible, but it is rather a broad field.

When did you complete your studies?

In 1988 or 1989, thereabouts.

And did you follow any additional training or courses afterwards?

Not specifically for this line of work, no.

What is your work experience?

I worked at the VROM for a number of years, at the environment inspectorate.

Did you work as an inspector?

No, it was in support of the activities of the environment expectorate in the field of research.

Thereupon I went to work at the NFI, where I have worked for the last 15 years or so.

At which department of the NFI?

Well, it really still is the environment department, although it has undergone some changes. But it has always focused on environmental surveys.

Do you make analyses? Can you tell us some more about your work?

Analysing is part of my job. Really I supervise research. The actual analyses are discussed with a co-worker. This has grown into a separate department, an actual analysis department, in which we discuss the research plans. We discuss the possibilities and impossibilities with the lab. In addition, and especially in this connection, we carry out emission surveys. I do those myself as well. If I look at the things we have done over the past 15 years, I can say that we started out with all kinds of environmental matters, including soil protection, waste legislation, environmentally hazardous substances. Further to the question from the client and the legal framework we decide what needs to be analysed and subsequently we set up a survey and report on it. In the past few years there has been a gradual shift, which is a deliberate decision of the NFI, to the investigation of incidents. This also includes chemical-technical aspects of the installations, what may take place within installations. In other words, the physical circumstances, the chemical circumstances, sometimes the toxicology, and making calculations and report on them.

After having read my statement I wish to add that I do not make any analyses myself, but that I am responsible, as regards analytical investigation, for the research plan and for interpretation of the analysis results in light of the questions.

What is your knowledge of statistics?

Very limited.

Does the NFI have a statistics department?

Yes. I have a colleague at the environmental department who is more specialised in statistics. Where the statistics of the analyses is concerned, that is really their line of work, their expertise.

After having read my statement I wish to state that where the statistics of the analyses (quality guarantee) is concerned, the responsibility lies with the analyst and the department where he/she works (currently the Micro traces department).

It also includes some standard calculation. What is your knowledge of that?

Merely as user. Although I do have some insight in the backgrounds of those models, what they are based on. But I am not really concerned with the mathematics behind these models. So I really only apply the programme. One needs to be familiar with the ins and outs in order to be able to interpret the results and to use them correctly.

What is your knowledge of the MARPOL?

Very limited. The question on that subject was: "Find out if any of the substances that were analysed, and whose presence has been demonstrated, are included on a list of the MARPOL". Which is what I have done. Thereupon I looked at the corresponding limit values. We tested against those. Quite instrumental, really. That is all.

Do you think you have sufficient knowledge for this specific approach?

I received a list, MARPOL Annex, with the request to find out if it included any substances that we had found in the material of the Probo Koala. Which is a legal question. I did not concern myself with the question to what extent this was relevant.

So you merely checked the substances?

Yes, just like you are better able to answer environmental questions where testing on limit values is concerned. It depends a bit on the subject-matter. We deal with MARPOL only very occasionally. Where waste that has to be tested is concerned, we have more insight in what has previously happened, in case law. But this was not the case this time.

Do you have any knowledge of the EWSR?

Yes. But in this instance no questions were asked about it in the report, in the investigation.

Further to questions from counsel De Swart:

What did you and do you know about the operation of the installation of APS?

Before the investigation and the incident at APS, nothing. Afterwards I got a pretty good idea of the process.

How did you come by that knowledge?

It turns out that the DAF-process is a common process for removing oily components from water. I was able to find information about the DAF-installation on the internet, in addition to technical information in encyclopaedia.

And as regards the other elements of the installation, such as the collecting vessel Main VII and acceptance tank 9. Did you gather more knowledge about those as well?

As regards the Main VII, only with respect to the tanks that were relevant for the material that came from the Probo Koala. Tank 9 is very important, so we did gather more knowledge about that. But we did not get all the information about the tank. I do have a drawing, which I got during a visit to APS together with the investigation team. It includes some details, but does not contain all the information that might be relevant.

Am I correct if I conclude that you gathered most information about the operation of the DAF?

No, of the combination Tank 9 and of the DAF.

Did you specifically focus on the DAF-installation at APS, or more in general how such DAF-installation works?

During that same visit, we received a drawing of the DAF. It included a document prepared by the designer of the installation, Lurgi. It was for a comparable installation in Rotterdam. I think this is also how I stated it in my report, that I used that information because after the visit and from what I had heard about it, I had the impression that the two were comparable.

Further to questions from the public prosecutor:

Was this also stated by APS?

No, I only concluded this after having examined it.

And the drawing was supplied by APS?

Yes, that is correct.

What was the message that came with it? Here is something that generally looks like a DAF?

Via the people of the police that were there we asked for information about the DAF and Tank 9 and received this.

Further to questions from counsel De Swart:

If I understand it correctly, you concluded on the basis of the drawing that the situation was comparable to the one in Rotterdam?

Yes, and on the basis of what I heard from the operator about its working and from what I have seen with respect to tanks. To what extent the dimensions might vary and about the interior I have of course no idea.

But you did not examine this either?

No.

You say: What I heard from the operator. Was that within the context of a police interrogation?

No, I do not how to describe it. We made a visit to take a look at the installation and the site of APS. As far as I know, no official reports were made of this visit. *After having read my statement I wish to add that Mr Peschier was also present at the visit to APS (and at part of the meetings with Mr Visser).*

Do you recall the name of the operator?

Yes, Mr Visser.

Do you remember who were there when you talked to him, or did you talk to him alone?

I would have to check this; I can't say it offhand. I do recall that of the police Mr Van der Kamp was present. And Kruithof. And a lawyer of APS.

Further to questions from counsel Bakker:

You just told us what you do, what position you hold at NFI, and what it entails. Did you already do this work in the period, say from June 2006 to September 2007, when you worked on the investigation?

Yes, that is comparable.

The meeting between Mr Van der Kamp and Mr Bakker on 3 July

Further to questions from counsel Bakker:

Van der Kamp stated (section 5.01, page 7): "I, Van der Kamp, was brought into contact, via VROM – situation room, with the pager of the Netherlands Forensic Institute (hereinafter: NFI). My call was returned by Mr F. Bakker (NFI). I explained to him what the matter was. I told him that the VROM and RIVM had no sample takers available on short notice and that for this reason I wished to avail myself of the services of the sample team of APS, which I wanted to take samples of the collection vessel Main VII and the DAF installation of APS in our presence. Mr F. Bakker thought this an acceptable option whereupon we discussed how the sample taking would proceed."

Is it true that you spoke with Mr van der Kamp on the phone, on 3 July 2006 on the subject of sample-taking on board of the Main VII and the DAF-installation of APS?

That is correct.

Do you know why Mr Van der Kamp contacted the NFI?

No, you will have to ask him. What he did was he called the standby service. We have a central information point for sample-taking, which means the practical side of it, and guaranteeing the quality of the sample-taking. So perhaps that was why he called us. It is a difficult matter, especially in situations like these, to take samples. Perhaps he also thought that we might be able to do the sampling.

What topics were discussed during this call?

What would be the best way to go about it. I recall that we discussed how to do the sampling and that he would have to keep a close watch if it was carried out by people of APS. I mean, to make sure that the samples were taken carefully, and not to lose sight of security, as he said something about a stench. At that time, nobody really knew what the material contained. It is possible that people of the company who have experience with it, in theory, that they say: this is how we are going to do it. So I warned Mr van der Kamp that if it were to be done under his responsibility, that perhaps they might use compressed air. That is how I would have done it, I would have used respiratory protective equipment. For the rest we mainly talked about how to take samples from these tanks.

What specific advice did you give him in this respect?

When sampling a tank you get the best result by taking a running sample. That is what I advised him. But it is not always possible to take a running sample. And sometimes a running sample should specifically not be taken. If you have a heterogeneous tank and it contains several layers and every layer has a different viscosity, when one is thicker than the other, you will have no idea how the bottle will be filled when you take a sample. I do not know if you are familiar with the concept of running samples? It means that you close the sample bottle, on the sample side, and lower it into the tank. Once it has reached the bottom you open the bottle and pull it up so fast that it will only be three quarters full. If you pull it up evenly and are experienced, it will pick up sufficient material from each layer. This will give you a proper cross-section sample of the tank. But it is not always possible to do it like this. But this is what I advised him, if there was anyone who had experience with this form of sample-taking. Because if you are not experienced and you are unable to properly estimate how fast to pull up the bottle, you will end up with a bottle that is filled to overflowing and your sample will not be good, or it will only be half-full and you will have too little sample.

You say: Not much was known about the substance at that time. But you also say that it is not always possible to take a running sample. So what did you discuss about the substance? Is your advice also based on the substance to be sampled?

I honestly do not recall whether we discussed this. But if I remember correctly all that was known at that time was that it was present in the slop tank and that it concerned waste water.

But you did not know whether it was possible, in this instance, to use the running sample technique?

No, that is correct.

But you still advised him to take a running sample?

These were the samples of the Main VII. It is possible, it seems to make sense, that it was known at the time – but I do not think we discussed this during our telephone conversation – that mainly the water fraction was pumped from the Probo Koala. This means, in theory, that the material will be quite homogenous, especially as it had only just been pumped in, which means that you can take a running sample. And I think that this is what was done in the end.

Further to questions from counsel Verbruggen:

Do I understand it correctly from your report, that when you reported the matter you still believed that a running sample would give the most representative result?

If a tank is homogenous, well, it will always contain minor differences, it will make no difference where you take the sample. The point is that you do not know and that is why you take a running sample.

But by that time you must have had some idea about the composition of the content of the slop tanks of the Probo Koala?

No, the tanks of the Probo Koala and of the Main VII were sampled in another manner.

But when you wrote your report, you knew what substance the Main VII contained. Looking back, were you still of the opinion that taking a running sample was the best method?

If you only have those samples available and you do your own analyses, there is no possibility, in principle, to determine whether the sample was good. It is even customary to fill more than one sample bottle. If afterwards one sample turns out not to be homogenous and you go to a different laboratory – sometimes we do it ourselves – and it shows large differences, you have an indication that the material was heterogeneous. But naturally, if you confine yourself to your own tests, you will do it on the basis of the samples that you received. In this case, APS itself had also taken samples. I believe one day earlier. These were impounded and were also analysed by us. These showed the same results, not quantitatively but qualitatively – I do not how my colleague described it exactly. The illustration is included in his report, by the way. In this instance we possessed two samples that were taken independently from each other and which show a comparable result.

After having read my statement, I state that my answer to this question is Yes. The sampled tanks of the Main VII were filled with the water fraction of the slops in the slop tanks of the Probo Koala. There is (even now) no reason to assume that there were several layers that should have been sampled separately.

Further to a question from the Examining Magistrate:

Do I sum it up correctly that at least on that basis you had no indications that a running sample should not have been taken? Or is this conclusion too strong?

It is in any event what you have to do, because at the start you have no idea of knowing whether it is the proper approach. You assume that everything is mixed together. If you go about it the other way and take a sample at one spot only, that would have been completely wrong. Because you might be in the wrong spot. What happens sometimes, and what is in fact necessary, is that if you suspect that there are differences in viscosity, in density of the cargo in other words, you begin by taking a sample from the top and a sample from the bottom. Subsequently, you examine whether those densities are the same. If they are, you have another indication that the substance is homogenous.

Further to a question from the public prosecutor:

Did you link the fact that the material was recently transferred to the homogeneity?

What you must understand is that the ship is at sea for an x number of days. During this time the material in the slop tanks have the chance to settle. As a result several layers will be created, oil on top, water underneath and perhaps some different layers in between. The water is subsequently pumped from the bottom of a slop tank to several tanks of the Main VII. I do not know how fast the material was pumped. In any case not the speed with which it was pumped to the Main VII, but usually this happens with such force that it will be entirely mixed in the Main VII at that moment. The only thing that you might do, is to fill first tank 1, on starboard, which is slightly different from the last tank, because you slowly drain the vessel. And that difference will be noticeable. The analysis report contains photographs of the samples, and these vary in colour. Anyway, analytically we could find no trace of this. The tanks of the Main VII as they were sampled by us or by the police, and by APS, are comparable.

Further to questions from counsel Bakker:

Why did you think it was an acceptable option to have the samples taken by someone of APS?

I told Mr Van der Kamp that if under the circumstances it had to be done by people of APS, because they were the most experienced as they take samples on a daily basis, well there is no other way. And in that case it will be acceptable, provided he is able to supervise the quality of the execution.

But you do not have any further insight in how the people of APS take the samples?

No, that will be his responsibility in that case. He is there when it takes place. All I told him was what the best technique would be, followed by what I just told you, to proceed in this way and that. I assume that, since Mr Van der Kamp works at the KLPD, he is familiar with taking samples from tanks. So if it is advised, where the situation so occurs, to take a running sample, because this will give the most representative result, I assume that he will notice it if it is not done properly, for instance because the bottle comes up only half full or filled to overflowing, and will act upon it.

During the telephone conversation, did you discuss a request for the investigation? If so, was the composition of the substance to be analysed discussed by the IMT or the CSI?

I do not recall, but I cannot exclude the possibility that he told me that we would get the samples.

Further to questions from counsel De Swart:

On 3 July 2006 you advised the police about the sample taking. What exactly did the police ask you, further to which you gave your advice?

I took the call in a train, so I was unable to make a note of it. This took place at about 7 pm. So I really do not recall. But I think that at that moment it was so, but still, this is just my memory of the course of events of 3 July, that Mr Van der Kamp joined the investigation at a rather late stage, in the course of the day. And that at that moment the source of the stench was being explored. And this eventually led to the Main VII, initially. At that point not much more was known than: "this contains slop, waste water from the cleaning of tanks". But I have absolutely no recollection that he said anything other than: "There is a stench here and I am charged with taking samples from my tank and how do I best go about this?"

That what it came down to, as far as you can remember?

Yes.

Was at that moment the question already being asked: "How much waste water from the Probo Koala may have been processed in APS's installations?"

No, that is not possible. I do not think so.

What did you know about the working of the installation of APS on 3 July 2006?

Nothing.

On 3 July 2006, were you familiar with the "Instructions for Sample-Taking and Analysing Environmental Offences" of the Public Prosecutor's Office?

Yes

At that time, did you know, generally, what it provided?

Yes.

The "Instructions for Sample-Taking and Analysing Environmental Offences of the Public Prosecutor's Office stipulates that the sample taking has to take place in accordance with certain methods or standards. Which standards applied this particular instance? Specifically: did any Forensic-Technical standards apply and if so, which?

Because it was known that the material concerned was waste, that is to say, it was stored in the slop tanks, I took, although it does not really make much difference, it depends on what standard you choose, the NVN 5860 as basis. If you ask me after the forensic technical standard, I cannot tell you the number. But in theory this is based on, developed from the NVN 5860 for sampling large tanks.

Do these standards stipulate anything about the knowledge and experience of the person taking the samples?

Whether the NVN 5860 stipulates anything about the standard? I do not think so, no.

And according to the FT standard of which you do not know the number?

Not offhand. But I do not think so either.

Did you discuss the question whether the person who was to take the samples possessed the required knowledge and experience with Van der Kamp during your conversation on 3 July?

I think he asked me if I knew anyone who would be able to do it. Because sampling waste is in any event something that was, and still is, a problem. At that time we had not had anyone for a number of years who would be able to carry out the sample-taking using protective respiratory equipment and from what I had heard I thought this would be required. I do not recall whether I referred him to Mr de Vrij, whom I knew. It is possible that I mentioned the RIVM, because they are often the last resort when it comes to that kind of sample-taking. They have lots of experience and all necessary equipment to carry it out safely. It is correct that I do not recall this.

Further to a question from the public prosecutor:

You said: It was a problem. What exactly was and is the problem? The number of people that are able to do it?

Yes, at least at the time. It is changing.

In connection with the request for the investigation of 4 July 2006 (section 5.4.9.5, p. 181 et seq.)

Further to questions from counsel Bakker:

I show you the request for investigation of 4 July 2006 of CSI Amsterdam. Are you familiar with this request? Did you receive this request at the time?

Yes. At least, let me put it this way: I assume that it is the same. It looks familiar. I did receive this document.

Were you in any way involved in this request, was it for example discussed with you by (someone from) the IMT?

No.

So you received it "cold" and there had been no consultation?

Yes. And it is also dated the 4th. So on the day after.

So you were not involved in the content, in the drafting of the request, in any way?

No.

On p. 182 of section 5.4.9.5 top left of the request it says: "discussed with: F. Bakker". How should this be interpreted?

It is the request. That means that it can only refer to the telephone conversation I had about the sample-taking. It is not uncommon that the police investigation team starts on the crime scene, and then has questions about the sample-taking and subsequently states on the request that it has been discussed with me much earlier, sometimes even one or two weeks ago. The only thing I can recall is that I spoke with Mr van der Kamp in the evening of 3 July.

But I just asked you if it had been discussed during that telephone conversation whether the samples could also be brought to the NFI. And you stated that you did not recall this.

I think the one does not necessarily exclude the other. The reason why he wrote it might be that he talked to me about the sample-taking but does not necessarily state that they would be sent immediately to us.

Did you have any further contact, for example with Mr van der Kamp, further to the request?

I do not recall. It is true that we received the samples shortly thereafter, I think it was on the 5th. Especially at the time when we received the samples and also because of the effects they had in the laboratory, it was discussed what we had and what we were going to do with it. In the end, the most important meeting we had on the subject took place on 18 July.

Remark Examining Magistrate:

The witness checks the summary he made in the log. I ask him to state what he remembers by heart.

It was discussed before the 18th, as there are two weeks between it. But it was already quickly said: "We need background information, a meeting with the investigation team, with respect to the samples and the rest of the case". At that time the major conclusions were drawn about the rest of the investigation.

Was that on 18 July 2006.

Yes

On 4/5 July 2006, what was your understanding of the nature and composition of the slops of which samples were offered to the NFI for analysis?

At that time I think not much more than that they were slops of waste water/washing water of tanks that had contained gasoline.

I mean on the basis of the request, not on the basis of the samples

I really do not recall when it was mentioned for the first time in that period, around the time when the request and the samples came in, that it concerned, for instance, sodium hydroxide. In other words, whether it concerned caustic water or basic water. I have no idea.

No idea when this was said or that it was said?

All I remember is the conversation of 3 July. This was followed by the request and one day later we received the samples. There is not much I can do with just that request. So during that first period it was very much a matter of determining what we had received. That is standard procedure. Do the sample codes fit; do I have everything that is stated on the request; do I understand the codes used by the team. I really cannot remember if I already knew at that time, during the first week, whether it concerned anything other than waste water from the slops resulting from the washing of tanks that had contained gasoline, or something.

In the request it is stated under the heading: 'Brief description of the crime': "seriously contaminated waste, treatment of chemically contaminated ships' waste and hazardous waste". What do you think is meant by this?

That was the suspicion of the reporting officer, or of the investigator.

But it was written down for your information. How did you interpret these terms?

On the basis of this text I just took note of it.

What impression did you have, of the type of substances involved?

None, it could be anything. I had no idea at the time what kind of tanks had been cleaned. Or of anything that might have happened in those tanks. This does not only concern the Main VII by the way. This concerns a lot more samples. In fact, in all of our cases we receive a description of what the investigation team thinks it has. We always contact them to ask: "What really happened?" So we seldom form an impression of what might have happened solely on the basis of this.

I wondered, if you read this, what kind of substances you would be thinking of?

None. Nothing specific.

Under the heading: "Relationship with other request (s) for investigation" the request states (p. 182): Previous research questions into Mercaptans". Did you or the NFI, within the context of the BROOM investigation, receive previous research questions about mercaptans? If so, can you elucidate this?

Yes, we had previously received questions about mercaptans

In what connection?

In connection with the police investigation at APS.

When was that?

I cannot recall offhand. There were several investigations.

But do you have a general idea? Was this shortly before you received this request?

In the preceding months.

Those previous questions you received, were these also within the context of the BROOM investigation?

Yes.

What kind of questions were they?

There had been several BROOM cases. I do remember mercaptans. But not any other topics. I only have a vague recollection. With respect to mercaptans it concerned expertise, if I remember correctly. What kind of substances are they? Where might they have come from? And I think there were also questions about how you can destroy them. Anyway, there had been several cases and I have no clear recollection about them at the moment.

Further to questions from counsel Verbruggen:

How many reports did you prepare in the BROOM related case?

I think the first report was in the case Probo Koala. The Probo Koala report. The first report, say, of 29 January, BROOM 4. I have this administrated under BROOM 4, with an NFI case number.

Have you made any reports of the investigations you have carried out in the case BROOM or of the expertise that you offered? Or an expert opinion? For example, the knowhow you made available about the mercaptans, is there any report of that?

Let me think. Sometimes I give oral information, but in that case it is not likely that it is administrated in the computer, not in this instance.

Does the log make no mention of it?

These are matters that happened three or four years ago. I assume that they concerned four cases in which I reported in each instance, but I cannot remember this offhand. But it should be very easy to find out if any reports were made. But I cannot tell you right now.

But it cannot be excluded that you offered for instance your expertise of which no report was made?

You mean an official report to the investigation team?

Yes, or to the Public Prosecutor's Office?

I would have to look it up. It should be easy to find out. I cannot tell you offhand.

In the case we know as BROOM 2, that is the case that is related to the Probo Koala.

How many expert opinions, how many reports were made in this case?

Two official reports.

Further to questions from counsel Bakker:

With respect to these previous cases in which the NFI was contacted. By whom? Also by the IMT?

As far as I can recall all four cases, I mean the elements that were given a separate request from us and that were numbered BROOM 1 to 4, were requests from the IMT Amsterdam.

What was the exact reason for asking your expertise? Was there a flow that was being investigated?

I would have to check these cases, something I have not done in years. I do not remember.

Further to questions from counsel De Swart:

With respect to the previous BROOM investigations in which you were involved: Did you receive any information in these previous investigations on, for example, APS, that you used in the two reports on which we are concentrating today, or in the two investigations that preceded the reports?

I cannot say for certain. Possibly later. But anyway.

What do you mean by "Possibly later"?

I cannot recall with respect to the previous investigations, but we did examine the acceptance samples that go into Tank 9. It gave me an idea of what may end up in Tank 9. But I do not remember this with respect to the previous investigations regarding BROOM.

Was the later investigation also related to the Probo Koala matter?

I do not think so.

Do you remember more or less when you carried out that investigation?

No. Possibly in 2008

In other words, after you had already completed the reports?

Yes.

Further to questions from counsel Verbruggen:

You stated twice: When I received the samples on 5 July. The samples, can you specify them?

These are the samples that are mentioned in this document, in the request from Mr Van der Kamp that we just discussed.

Are the samples that are stated in the attached request "the" samples you mentioned?

Most simply, they are the samples from the slop tanks of the Probo Koala, from the Main VII, the samples impounded from APS from the Main VII and the samples from the DAF. I think only those from the DAF of 3 July.

As regards the term: "hazardous waste". In your field of expertise, is "hazardous" a uniform term?

No, absolutely not.

"Hazardous" always depends on the context?

Yes.

In your field of expertise, is "contaminated" a uniform term?

No.

How would you qualify it?

That depends on the legal context. And not only on the legal context.

But I asked you, in your field of expertise? After all, you are not only an expert witness, but also an expert.

But in my field of expertise I am also confronted with completely different questions. What is in any event used indiscriminately, is hazardous within the meaning of what is now the Eural and whether it is in fact hazardous, which is not necessarily always the case. These terms are used indiscriminately.

Questions from the Examining Magistrate:

In your report of 29 January 2007 you state with respect to the sample-taking on 4 July 2006 (page 6401): We took samples of the final 250 cubic metres on 4 July and this contained more oil. Who do you refer to with "we"?

That is the problem. I have not been able to find this anywhere.

Because I have not come across your name in connection with the sampling on 4 July, nor that of any one else of the NFI?

That is correct. To make matters clear: the cause for the investigation, at the time when you are writing your report, you look backward: "What information did I have at the time when the request was made, in this instance possibly with the information of 18 July, about what might have happened ". In fact, "us" means Mr van der Kamp. Because they are quotations. Because it is also written: the following information was obtained by the reporting officer. It is a heading.

Was the NFI in fact involved in giving advice on the sampling on 4 July?

Not differently from how it was involved on 3 July. Because they were all taken in stride. I was called on the 3rd. I think the samples were taken during the night. And the next samples were taken on the 4th. The samples from the Probo Koala were taken on the 4th.

But was the sampling of the Probo Koala also mentioned in your telephone conversation with Mr Van der on the 3rd?

I do not remember.

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The research questions and the consultation on 18 July 2006

Further to questions from counsel Verbruggen:

If I am right, you describe that consultation took place on the research questions. Is that correct?

Yes.

Can you indicate when, with whom and how often consultation took place on these research questions?

During the entire period from the request until the report. It is recorded in the abbreviated log report.

But can you indicate for us, in broad outline and on the basis of your memory, how this took place?

The original question was to examine the composition of the most important samples from the Probo Koala, Main VII and DAF. That was stated in the request. The request also mentions with respect to the locations I just mentioned what was to be analysed and examined. These are some quantifications, but also already comparison questions. I recall that on the 18th part of the quantification was annulled, because we had already carried out an investigation on the basis of that first question. And also because we argued that it contained organic material and we have a standard investigation for that. We have to do it anyway. So we made a start on it. I think it was subsequently stressed in the report of 18 July that the comparison was the most important. Did any material that originally came from Probo Koala end up in the DAF via the Main VII?

In other words, requests were specifically aimed at the composition?

But also, already: Where do the mercaptans come from. This already harbours the comparison question, or as to origin.

Did you have any more contact between the request and the consultation on 18 July?

I have just noticed it, on the 14th. Look, the point is that if you want to carry out an investigation that is useful, from an analytical point of view, and to ensure that it does not become too costly because you are not doing the right things, you have to consult on a regular basis.

Who determined at that moment what is "useful"?

It is a consideration between the investigation team, usually one contact person. With respect of this investigation this was initially Mr Van der Kamp. And it then becomes an interaction. If the investigation team spots something of which it thinks that it either has expertise on it, or that might require additional research, we are called. And the question is asked. If I am able to decide myself whether or not an examination is useful, I will consult the lab, the analysis department. This was in this instance in 99% of the instances Mr Peschier. It also happens and this was certainly the case in this instance, that in the first analysis carried out by Mr Peschier, simply to see the kind of material we were dealing with, that he encounters substances of which he decides that they may also be relevant. So we report this to the reporting officer. Which makes it simply an examination of the composition. He initially had his own ideas of what might be relevant. This shifts slowly until the analysis examination really decides what you will do next.

So what you are saying is: There was a request for an investigation, there was some contact, and then came the 18th and that was a direction-giving meeting. Is this correct?

Yes, because at that time the washing of gasoline-like material with spent caustic was already mentioned. Which was something that we had already established ourselves, the material contained spent caustic. I think it was also known at the time that the samples also contained naphtha-like organic material. There was a global idea about the composition of the water. Let me put it this way, we always interpret the summing up of the parameters, the quantitative analysis instruction let us say, of the investigation team, as: "They want to know what it contains and if possible to be able to identify the material". If you are able to do it, which is not always possible with waste, this is the strongest. This is how you get started, on the basis of this notion. What also played a part in this instance was that many of the quantitative determinations the team had requested are not exactly free of charge. Because they have to be contracted out to an oil lab. The entire programme may easily cost 10,000 euros. This is not something of which I can decide "let's do it". Because it is way over budget. So in this respect there is consultation on what the investigation should comprise as well.

The budget element and the fact that choices have to be made because the investigation is not quite free of charge, is something that you bring up a well?

Indeed.

Will an impact on new research questions be put on paper further to such consultation?

I asked Mr Peschier to make a report, which he did. This was also forwarded to the team and I think also to Amsterdam, to Mr Hulscher, who also attended the consultation.

Who was your contact in the team?

Mr Van der Kamp.

At this stage, did you also already consult with representatives of the Public Prosecutor's Office?

On the 18th? No.

Did you get a go-ahead from the team or from the Public Prosecutor's Office further to the report that was made of the consultation on 18 July 2006?

Not in this case. It was duly noted.

Did you have any consultation with anyone after 18 July 2006 about the research questions, the investigation to be carried out, the formulation of those questions?

More or less regularly. I do not remember the exact dates, but I did write them down. This is how it went, I think. Of course it was already July. Sometime in August, just before my holiday, I made a summary of what I had received from the police as background information about the installation of APS, their license, the measurements we had taken, and what this might mean for several scenarios with respect to the Probo Koala, Main VII and what we might add to the investigation. This was also duly noted. This note is not included in the file.

Is it still available?

Theoretically. It is still somewhere.

So you made a summary of what you received, what you thought and what you did?

Yes, and of possible scenarios. It really is a sort of brainstorm document to be used in consultations in order to determine, if you decide on a particular scenario what investigation might be carried out. Because that still was not clear to us at that time. We had made quite some progress in determining the composition, but we did not have the quantitative results, only a fair idea of what it was all about. But it also contained the question what the risk for the surrounding area was due to the stench that was created as a result of the substances that were released.

Was that included in the discussion memorandum?

Yes.

So it was not something that the investigation team had put on paper?

I do not recall the exact chronological order. I am even wondering if perhaps it had already been discussed on 18 July.

Please continue on the basis of your memory. We will address the dates later.

Well, I then went on holiday and when I came back two weeks later all hell broke loose about what happened in Ivory Coast. From that moment onwards Ivory Coast, as regards the composition of the waste, for what we still had to do, partially determined what happened in the subsequent months. And that was in fact all under the UN flag.

You say that all hell broke loose about what happened in Ivory Coast. Did this add a certain degree of urgency to the investigation you had to carry out?

I think that I already reported on 27 July, in any event at the end of July, in part on the basis of the information we had received from the team, from Mr van der Kamp or his colleagues, and in part on the basis of what we had found ourselves, the analysis results, that we got an impression of the refinery process as it takes place in refineries. I mean, the desulphurisation with lye extraction. We mailed this to the team. That took place at the end of July.

Can we find this document in the file?

I do not think so. It is not a discussion memorandum. We discussed with the team that we were able to identify the entire amount of waste in the slop tanks of the Probo Koala. When it came to light, on or around 7 September, that the cargo was possibly dumped in Ivory Coast, we were an independent institution that had in any event examined something that had previously been or possibly still was in the tanks of the Probo Koala. It was discussed internally with the Public Prosecutor's Office, via various channels with the team, that the results would be made available. I recall that what was specifically concerned was the further quantification of the mercaptans and the phenols and of phenol itself and that this was lacking. We forwarded several interim reports to various bodies involved in what was happening in Ivory Coast. This took weeks.

Has the discussion memorandum, in the form in which you had prepared it, been subject of discussion?

No.

Was it made redundant by the actual events in Ivory Coast, as it were?

You would have to ask Mr Van der Kamp. I can imagine so. But parts of it, choices of what was eventually reported as research questions, were subsequently addressed again in the consultations. Not on the basis of that memorandum but because it was still important to know whether it had been demonstrated that the DAF had contained material from the Probo Koala. In other words, the comparison questions. So the subject did come up again, but the memorandum itself was never discussed.

You say: "via various channels consultation took place". Which channels do you mean?

If I recall correctly, the first contacts went through Mr Van der Kamp. The decision which results to be made available always took place in consultation with the Public Prosecutor's Office, either by me with Mrs Spoor or Mr Boogert.

But you mention various channels. So which channels do you mean?

The team, Mr Van der Kamp, the Public Prosecutor's Office, the persons I just mentioned. And afterwards, in consultation with Mr Van der Kamp, also with representatives in Ivory Coast and France.

Do you remember the names of these representatives?

I have the name somewhere, but I cannot tell you offhand. People from the embassy, I think, as far as I was able to make out.

But were they fellow chemists, analysts, lab technicians?

I do not think so. They are mentioned in the progress report. It contains a list of people I had been in contact with.

Did these institutions or bodies also communicate directly with you or the NFI at some point, or did the contacts always take place via the team or the Public Prosecutor's Office?

We also had direct contact. Or at least, it was tried. But this failed for the most part. There was a telephone call, some emails containing the composition data. But in any event we tried. I have no idea whether they received their destination. I have tried it myself with the email addresses I had received. And it was also tried via Mr Van der Kamp. But the telephone conversation was in French, and I do not speak French. I asked a colleague if he could ask that representative from Ivory Coast what he wanted from us. I think that contact had been established via the team. It all took place within the context of: the NFI knows what this is all about, what material is concerned, and in support of the people in Ivory Coast who were involved in the identification and the cleaning up. But the other bodies that were involved, and I understand that this took place under the UN flag, were RIVM and VROM.

Did you also speak to representatives of VROM and RIVM?

Yes.

Did you have any contact with people from the UN?

I cannot say offhand whether any people were involved that were directly at the UN.

So all these people came to you for information, or did they also sometimes offer you information?

You mean if those were these people? Information was made available via the team that analysis statements of the material in Ivory Coast.

Do you remember who made those statements?

I seem to recall that the bore the name of a lab or of a lab associated with a refinery. But I do not really remember. Where it all came from, what was examined, where the sample came from, I have no idea.

Further to a question from the Examining Magistrate:

Did these results play any part in any of your reports?

We compared them with what we had found ourselves. They were clearly different.

Further to questions from counsel Verbruggen:

Where can we find this in your reports?

You cannot. Ivory Coast was only relevant in order to supply them with information, to support the people in Ivory Coast. But for the rest it was not material.

You also said: "And then we sent several interim reports to various persons". Do you remember which reports, and to whom they were sent? Or do you need to consult your files for this?

I made a summary in my log. I wonder if I put everything in there. I did include a remark that four and possibly five statements were sent, within the context of Ivory Coast – but not just for Ivory Coast, but also for the Public Prosecutor's Office and also for the team – stating the compositions. Solely in order to clarify the progress.

Did you, before you disclosed or provided those documents to third parties, other than the team or the Public Prosecutor's Office, seek permission or approval?

They were always forwarded via the team, which means Mr Van der Kamp. Or with their permission if I received email addresses from them to send them to. Or of the Public Prosecutor's Office.

After having read my statement I state that the requests for information for Ivory Coast always came from Mr vd Kamp, that my department head was aware of this and that although I recall that there had been contact with the Public Prosecutor's Office, I cannot find any notes in this respect.

Further to a question from counsel Bakker:

Did you also need permission from within your own organisation?

Everything was discussed with my superior at the time and with the department head in my presence, or between those department heads.

Further to a question from counsel Verbruggen:

These several interim reports that you made available to various persons and bodies, are they still available in the form in which you made them available to them?

Yes.

Further to a question from counsel Bakker:

Are there any rules within the NFI about making interim reports available to the client or other parties? Is there a protocol or something?

I do not know if there is any protocol. But as a rule no reports are made available to third parties that are not involved in the investigation, except in consultation with the Public Prosecutor's Office.

Further to questions from counsel Verbruggen:

Did you ask the team, Mr Van der Kamp in this case, and the prosecutor and the Public Prosecutor's Office about the legal basis for making these documents available?

The legal basis? No.

Did whatever you were examining and the information you received and that you generated have any impact on the evolution of the questions in the report intended for the Dutch team?

No. From the beginning the various questions related to the composition. Perhaps not implicitly, but the best you can expect with respect to waste is identification. Furthermore, the questions related to determining whether there were any indications, through the analysis of the samples of Probo Koala material having been processed in the installation of APS and in the DAF-installation and whether the material was in any way harmful for the surrounding area. I think that this latter question was added at a later stage. And then there were a number of sub-questions. For instance the question: "is the waste hazardous if it is a waste product?" The MARPOL question came to the surface in the course of the discussions with the team, like we just discussed. I mean, they wanted to have this reported on and examined.

Did it go like: if the team had a slightly differently phrased question or subject, this would be confirmed by you in writing, so that a paper trail would be created resulting in the questions as included in your 29 January report, or did it also include verbal exchanges?

There is a lot of verbal exchange. The question about the waste legislation was initially asked verbally, I think. But I seem to recall that there was also an email exchange on the subject. I believe that the question about MARPOL cropped up during a consultation. Thereupon, because we did not possess the MARPOL lists, they were mailed to me.

At the beginning of the investigation the Public Prosecutor's Office also examined the risk the substances posed in Ivory Coast. It was discontinued, but that was also done. Did the investigation team or the Public Prosecutor's Office ask you whether the substance could be hazardous for the people in Ivory Coast?

Acting on a request of the UN an investigation team went to Ivory Coast, consisting of people from the RIVM and the VROM. The team also included people who worked for or had contacts with the NVIC, the Netherlands Toxic and Information Centre. Within this context I spoke with the director of the NVIC about the toxicity of the material, based on what we had found.

But was there a specific research question from the Public Prosecutor's Office or from of Mr Van der Kamp or from the team?

No.

How did you arrive at this final question? Was it in fact finalised in consultation with the Public Prosecutor's Office and the team leader?

We had already consulted on the matter in October 2006 by which time the question was more or less final. There was some discussion or uncertainty about all lateral research that were carried out and whether this should be mentioned in the report. I subsequently sent an email to the team, in November, stating: "I will report it like this; these are the subjects that are important for the report". I still have that email, and these are still the same questions that we just discussed. The only thing that was left out in the end, something that we did examine, was with respect to Martens VII. At some point this matter was raised. Samples had been taken on board of the vessel, but something had gone wrong and we investigated it. But presumably this had such little bearing on the case that it was never included in the report.

Earlier I asked you if "hazardous" was an objective term in your field of expertise or that it depends on the context. You said it depended on the context. Am I correct in saying that you would need a considerable amount of information before you would be able to say something about the hazardousness of a substance in, for instance, Ivory Coast?

On the one hand you have objective characteristics, those that are mentioned in the substance documents. The less that is needed of a particular substance, as a dose, the sooner it will be marked as toxic substance pursuant to the Chemical Substances Act. Because the term "hazardous" is in fact not used in that Act. Either it is toxic or it is not. But whether it is actually toxic in certain circumstances, depends on those circumstances. Let us assume the composition as we found it. Whether it would be hazardous, if dumped in Ivory Coast, totally depends, among other things, on the circumstances there.

So that is the context, yes.

Further to questions from counsel Bakker:**You stated that on 18 July there was as yet no direct contact between the NFI and the Public Prosecutor's Office. Can you recall when you first had contact with representatives of the Public Prosecutor's Office?**

I think that must have been in September.

What was the cause?

I am not really sure. Perhaps we had already consulted in July, August, as well. I do not remember. But we definitely consulted further to the developments in Ivory Coast.

What was discussed during that meeting?

Members of the team had been in Ivory Coast. They reported back on what they had encountered.

I also believe that the WOL was discussed. The framework, in other words, the legal framework, in which the investigation would henceforth proceed. Priorities were made.

Can you explain this?

Not offhand. I can look it up, but I cannot tell you offhand.

What do you mean with priorities were made?

I think it was remarked that MARPOL should be given a closer look, and we consequently received those documents, the MARPOL list.

Can you give us a specific moment when questions regarding the hazardousness, which Mr Verbruggen also referred to, were raised?

Rather quickly, I believe. I think sometime in July. Perhaps on the 18th, perhaps it is stated in the report of the consultation of 18 July.

Further to questions from counsel De Swart:

You have written two reports, one dated 29 January 2007 and one dated 6 September 2007. What was the key question in the first report that was submitted to the NFI?

I cannot recall offhand. Those questions were already asked in the first request. I think there were three questions, three key questions, on composition and identification. Was material from the Probo Koala processed in the DAF? Can that material be found in all of the tanks that were sampled? Including Tank 9 and also Tank B2. And the questions regarding emissions, the harmfulness of emissions, if any. And other questions about hazardous waste and MARPOL, were added, and perhaps I may have forgotten one.

The three questions you just mentioned were the key questions that formed the basis of your first report.
Yes.

In your report of 26 January 2007 it is stated, on p. 22: "*Within the context of the investigation it is important to determine how much waste from the Probo Koala/Main VII ended up in the installation of APS and how much of it was processed in the DAF. On the basis of these data it will, for instance, be possible to calculate the source strength (...); one of the essential parameters for emission calculations (one of the elements of the investigation aimed at finding an answer to the question about the risks processing of the Probo Koala waste in the DAF by APS poses (question 6)*". Is it true that the aim of this 'determination' was specifically to arrive at a correct calculation of the emission and not so much at an exact calculation (with an accuracy expressed in litres) of the volume waste water that had been processed?

Yes, I think the one cannot be isolated from the other. I have made no mention of it yet. This is the dilution factor, as it were. That it happened was caused by the fact that it was unknown how much of the waste had ended up in the installation. I asked the team on several occasions if they had a scenario of what had happened on 3 July, both as regards quantities of material that had possibly been brought on shore from the Main VII, and as regards the route in the installation. Incidentally, that was also the object of the visit of 27 October, which I think we discussed already. Because there was no scenario and it was necessary to have some idea of the concentrations of substances in the surrounding area we simply assess a scenario. On their part the team subsequently came up with the proposal like: is it not possible on the basis of the comparison that results in the dilution factor, to calculate or make an estimate of how much was processed and consequently might have come on shore. And to determine the source strength on that basis.

Let us go back to the document I just held up to you and to the question I just asked you. Was the question determining an x amount of litres that might have ended up in the DAF? Or was it really about the emission calculation? Or both?

Look, you can only calculate the emission if you know how much material entered the DAF and what concentrations of substances it contained.

But my question really was, was the objective of the investigation described here to arrive at a calculation of the emission, or was it only aimed at determining how many litres had ended up in the DAF. Or was it both.

Let us say that if there was a clear reason, it was to calculate the emission. It is possible that the team thought that they could also have both. It is hardly possible to separate the two. But whether it was made explicit, I do not remember.

Why was there felt to be a need for a second report, after your first one?

It concerned entirely different questions.

To what extent were the questions different? Can you describe this?

The team had prepared a report of the complaints that were reported during the period concerned, I think until September even. APS has indicated, had stated, that 220 litres from the Main VII might have been processed, ended up in their installation, but not more. This amount was what apparently had remained behind in a pipe. In the end, the question addressed in the second report was whether a link could be found between the two. Whether the complaints were in any way connected to the processing of those 220 litres.

Who took the initiative to the second investigation? Was it carried out further to your advice, or at the request of the Public Prosecutor's Office and/or the police?

The specific question to make the link with the 220 litres, those data I received from the police. It was discussed, and a consultation took place, to carefully consider the overview prepared by the police and the link the police had made between the complaints and the activities at APS. I asked them if they would agree to submit this to others as well, whereupon it was also submitted to the NVIC. In the end we also received the request for the second investigation. What exactly was the reason to submit it to us as yet, is something the team will know.

But was it the team that came up with the idea to examine the scenario of those 220 litres and the complaints, or did the idea come from the NFI, from you?

I did on occasion discuss the possibility with the team to examine whether it was possible to calculate backwards on the basis of the complaints. By taking the complaints as starting point. Let me rephrase this. A sort of health endpoint is taken as starting point. For instance complaints about stench. And these complaints may be serious. In this instance there were complaints about headaches, nausea, etc. These characteristics are ascribed to substances if there is a certain degree of exposure to it. This depends on the source strength and in this manner you may, in theory, arrive at the source strength on the basis of the complaints.

Was the decision to make a second investigation also motivated by the fact that the first report had not yielded the 'desired' results?

I do not know.

It was not discussed?

No.

Is it true that the "processed quantity" by APS (as presumed by the police) was not object of a question until the second report of 6 September 2007?

Once it is stated: find out how harmful these emissions and that stench would have been, in other words, if they presented any risk, you need a source strength and consequently you must know how much has been processed. In fact, this link has at all times been made. Perhaps not explicitly, but it was unavoidable.

Is it true that it was decided in the second report to estimate the processed amount on the basis of the recorded complaints (about the stench) from people living in the vicinity?

No. You can do two things, and I did them both. You can calculate how many toxic substances or harmful substances may be released based on the composition and determine, if you combine it with other parameters, what concentration this will result in. If this fits in with the image that is created by the complaints, you may consider the source strength. The processed quantity, in other words. But it is also possible to do it the other way round, if you have a clear endpoint, for instance if people have serious pulmonary complaints, I am just giving an example, it is not something that necessarily happened in this case, and you say: "but these complaints only occur in the event of that amount of exposure, so what source strength is needed to arrive at that concentration and in what time". And those two things is what was considered in the second report.

Further to questions from counsel Bakker:**I see on the covering page of the report, the report of 6 September, as date of the request 4 July 2007.**

Yes.

Did you receive a written request with that date that forms the basis of this file?**Because I cannot find it in the file.**

Yes, I think so.

Do you still have it?

Yes.

Could you submit it to the Examining Magistrate. Because I do not think it is in the file.

Remark Examining Magistrate:

I request the witness to submit this request to me. The public prosecutor has no objections.

On the covering page the case number: "2006.07.05.024 request 7." is stated. May I assume that with respect to this investigation at least, 7 requests were submitted to the NFI?

I think they were even at least nine. But this is only important to us for administrative reasons. I know that request one was the request of 4 July. I think request two concerned the next batch. It will be possible to ascertain this on the basis of the codes of the svo's, which I think are mentioned in the report.

What do you mean by "next batch"?

On 10 July 2006 samples were taken of the DAF and Tank 9. I think these were delivered on the 20th, or some weeks later, may two weeks later, to the NFI.

And this is regarded as a new request?

Yes, also because they could have involved different questions. That was quite possible. This was not the case this time. In this case it would actually have better to continue numbering from request one. Anyway, they come in, someone brings them to the administration, and turns it into a new request. But the fact that I was summoned to appear before the court is also regarded as a new request by us, but that is just in order to record the hours spent. For accounting purposes.

Further to questions from the Examining Magistrate:

Looking at the annexes to the report (section 9.15 page 6461), I see the indication svo 2. Is that what you refer to?

Yes, that is what I refer to.

And you continue numbering?

In fact, it is even obligatory now, within the organisation. This is a good example. It is purely administrative. To gain insight in the time spent on products, on requests, it is better to split them up and complete them.

Further to a question from counsel Bakker:

So what did these nine requests consist of?

The first one is what it says. Two and three may also be derived from the sample overview. I am referring to the first report, the annex to the svo's.

Further to questions from the Examining Magistrate:

Perhaps for a better understanding: on annex 1(page 6460) it says: "1001, 1002, 1003". Does that mean investigation I?

Request I.

And that is subdivided again?

We continue numbering the documents of conviction.

On the next page, page 6461, it says 2001. Does that mean request number 2, document of conviction 1 and on to 6.

That is correct.

Further to questions from counsel Bakker:

And that continues up to request number 4. Is that correct? And how does it go from there?

That is correct. I looked up which questions formed the basis for five, six, and seven. It includes also a request with respect to the Martens 7.

You mean, seven refers to the request for the report that we just discussed?

Yes. And I seem to recall that 8 is concerned with the transfer of the counter-samples. But I am not sure. I noticed in the administration; well, let us say that as a staff member you have to accept a request. And I think 5 and 6 were simply refused because they formed part of an earlier request. So they were in fact registered and consecutively numbered, but there are no additional research questions that we acted on. When so asked, I state that it is correct that the first report concerns requests 1 to 4, and that the second report starts with request seven.

Am I right that the question in the request for investigation: "Do the samples from the DAF-installation of APS comply with the acceptance criteria of the AO/IC, with respect to this DAF?" in the report of 29 January 2007, was no longer asked and answered?

That is correct.

Why was that question deleted?

In the end the questions that we already discussed were agreed with the team. We received an email in November containing all previous consultations and research questions. Because I was expected to report, I decided to get things straight on what we were able to report. A consultation had taken place on the matter one or two weeks earlier. These questions were also addressed in the report, but this one was somehow left out. Look, in fact this is a question of, for example, the EOX level, the degree of chlorine that could be extracted, which we examined. I think this is also mentioned in Mr Peschier's report. And with so many words; like, that might be of interest to test against the acceptance criteria of APS, but we were never asked to test this.

The reason why I ask this, is because it seems to be phrased like the principal question in this request. That is, the questions are listed in order of importance, and this is the first question on that list.

It depends on the insight the team has at that time. It is quite common that there is a shift during the process of tactical investigation they carry out and the analytical investigation we do.

But did the NFI find the answer to this research question?

No, but you can of course use the results of the composition investigation for testing against the acceptance criteria.

But this test has not taken place?

Not by me.

Further to a question from counsel Verbruggen:

Does that mean that in the end it was these seven questions that became the questions in consultation with the NFI and the team? And does that also mean that in the set-up of the report the material is used for what is relevant for answering these questions, but that it is possible that other results from the investigation are not included in the report?

What you are asking is whether we have any other results, have carried out other research, that have not been used in the investigation? The Martens 7 is an example of research that did not end up in the report. But I have noticed, upon rereading the analysis report, that investigation results were included in the report simply because we did conduct an investigation, and that they pertained to previous questions, EOX among them. This was in fact included. For instance, we also examined retrieving catalysts that might have been used in the process in connection with the Probo Koala and the extraction of the sulphide compounds. This is not included as an explicit question. It is more like an investigation of the details. But a lot, if not everything, did end up in the analysis report, in fact also the information about the catalysts. Because it was in fact rather a complex substance. It was

checked whether there were any indications, by way of research, whether that was the case. Some indications were found.

Further to a question from the Examining Magistrate:

Were there more investigations carried out, or are there more results, apart from those you just mentioned , with respect to the Martens that did not end up in the report.

No.

Further to questions from counsel Bakker:

Earlier, you mentioned something about comparing samples you had received from Ivory Coast. Or did I misunderstand you?

We absolutely did not receive any samples from Ivory Coast. All we received were analysis statements. If these might be regarded as such. But these did not form part of the investigation. The question of involvement in the Probo Koala material to check my opinion of an analysis statement and whether it corresponds with the composition results as we found them, came back several times. At some point there seem to have been transports to ATM. We received several statements.

Why do you say so emphatically: This has nothing to do with this case?

It has nothing to do with it, because the team never asked to include it in the report.

You said yourself, just now, that part of the results found their way to other parties, after Ivory Coast. They were even made available to the authorities in Ivory Coast to allow them to compare them, to find out if they concern the same material. Conversely, you receive analysis statements from Ivory Coast. And now you are telling us that it has no bearing on the matter. I do not quite follow you.

If you consider the chain of sampling and the transfer to Amsterdam, I have some insight in the origin. We do the analyses ourselves. But when I receive a statement from Ivory Coast, I may make comparisons, but what does it mean? If the team asks me to include it as svo, as a document of conviction and give my comments.

So why do you examine it?

Because apparently someone in Ivory Coast regarded is as representative for the material that was dumped there.

But what if what you had found corresponded with your own analysis, would it have been relevant in that case?

In that case it would possibly have been relevant for what possibly had happened in Ivory Coast, but not for what had happened in Amsterdam.

But in that case, it would still not be included in your report?

I do not know. It would depend on the question of the Public Prosecutor's Office or the team.

On 4 July 2006 You received a request. It said urgent. The results were not finally laid down until in a report dated 29 January 2007. Why did it take so long?

There were three weeks between finding out the composition the material turned out to have and sending an interim report, stating that we thought that the waste was caustic, spent caustic. The quantification question, with everything that was going on from September until November in connection with Ivory Coast, together with the preparation of the interim report, took up a lot of time. Next, we received the question regarding the emission, the Section 173 criminal code question, say, about the possible risk. And then some standard calculations had to be made which also took up some time. And these were not available until November, really.

In connection with the report of 5 October 2006 (section 9.20, page 6012 et seq.)

Further to questions from counsel Bakker:

On 5 October 2006 an interim report was prepared. Did you prepare this report?

Yes.

What was the reason for preparing the report?

I do not know if there was a specific reason. Most reasons in this period were connected to finalise the investigation of the composition. And it was also in the midst of the events in Ivory Coast. There were regular developments from an analytical point of view, to add the final details as regards the composition. If there were any changes that might be of interest, we would send an interim report.

After having read my statement I add that this report was prepared at the request of the public prosecutor, Mr Boogert

An interim report? But are these the final results?

No, these are included in the final report.

How should I see this? Because you can go on updating all the time, but value will be attached to the results nevertheless.

The team wished to be informed as quickly and comprehensibly as possible about what we found. To write a final report, including all proposed internal actions, usually takes some time to complete. Especially in this case our findings may be valuable for directing the tactical investigation. That is why we keep them continually informed. We also have another method of interim reporting, but that is much more formal. This one is less so. In that case the investigation is more or less completed. In this case we have a quantitative result, together with our interpretation. About how we see things at present. Finalising the report etcetera may take a number of weeks, but here you have the updates of the results to date. About the composition.

Further to questions from the Examining Magistrate:

But if you consider a statement with compositions on the second page (section 9.20 page 6013). Are these measurements correct? Are those the final measurements?

All I can say about it is that the final results are included in the final report. It is possible that we had to add something to these results. Or corrections.

Did you afterwards, for example, repeat some of the measurements?

This report dates from December. At least, it says here 15 December 2006. It is possible. Because I am looking at the phenols now. And we had very lengthy discussions about the phenols.

Further to a question from counsel Bakker:

But the date of your interim report is 5 October and we now conclude that we are looking at annexes that are dated nearly three months later. The covering page says 15 December. So what is the date of the interim report?

I need to consult my own files to find out what this means. *After having read my statement I state the following. It has appeared that the memorandum dated 5 October includes a footnote containing a date field that is automatically adjusted to the computer's system date. The correct date of the covering page of the memorandum is consequently 5 October 2006.*

Further to questions from the Examining Magistrate:

Because you did in fact prepare an interim report in October?

There were at least four, I think, of that type of reports, sent out in several forms. Sometimes they would include an interpretative report. The reading of the mercaptan concentration, the description of the acidity, but especially the phenols, and possibly also the hydrogen sulphide, we did not have complete until sometime in November. That is when we finally had the last results.

After having read my statement, I remark that it is not clear to me what is meant by "in fact" in this regard. Two types of report were submitted: interim reports in the shape of memorandums, and final reports.

The interim reports on the composition are dated

7 September, sent to Mr vd Kamp

8 September, sent to Mr vd Kamp and Mr Meulenbelt NVIC, and on 10 September to Mr Franoi

15 September, sent to Mt Hageman (IMT), Gesret France, Meulenbelt NVIC

5 October, sent to Mr Boogert and vd Kamp

But if I see as date 15 December, does that mean that the report was not prepared until December?

I would have to look it up in my file. I did bring the interim reports.

It does include one interim report, but not another. And the information that is included in all those interim reports, are they all also included in the final report?

Can I have a quick look? Yes, I think that is everything that can be found in the first table of the main report. I cannot see immediately whether this is also true for the listing of the individual mercaptans, that are printed in bold type, main component. I really would have to compare them. There are two or three pages. But I especially checked the quantitative numbers that are stated in the first table and I think those were eventually also included in the final report.

You just mentioned in passing, with respect to page 6014, something about bold type. What does that mean?

Yes. This is also how it is stated in the analysis report. The summing up of the individual mercaptans and phenols is based on a qualitative investigation. Which do not yield firm concentrations. But an analyst is able of course to see that one peak is considerably higher than the other. And in order to avoid having to represent all the information, it is stated in this manner. The most important are those substances that are printed in bold type. But it is all relative, of course.

Further to questions from counsel Bakker:

Does the NFI have any guidelines for making and sending interim reports and for making reservations?

Because as you said yourself, the results are only preliminary.

If it is, say, a report that has been signed it is, for administrative purposes, an interim report. And this one is not. It might be that in the interim reports that were specifically written for UN, for Ivory Coast, it is stated that the results are only preliminary. I cannot remember that this also happened with those for the team. The point is that although the analyses are not yet complete, because the quantification is not yet finished, the team is waiting for the results. That is why we send these reports. And they know that the results they contain are only preliminary.

But what is the limit for you, as NFI. You must also guarantee that there is some certainty as regards the information that you provide and you must realise that an IMT might take action on the basis of those results.

There is a long course to follow to clearly express the preliminary status of the results in the reports. This has not happened in so many words in this instance. Possible we might have added that the results were only preliminary. But the team knows at that moment that they do not have the official final report and that the results are only preliminary. It is their responsibility, when all is said and done. They can always call me to ask me how firm a specific number is, because we must also add this and that.

But as a NFI examiner, surely you have your own responsibility not to disseminate results that are not yet final?

Well, the preliminary results are not simply off the cuff. They are measured using official methods. We had no reason whatsoever to doubt them. And certainly judging from what I just saw, certainly with respect to the December report, that was almost the final result, there are no longer any discussion about the numbers it mentions.

The covering page contains a selection of quantification identification of all substances due to the complexity possibly a selection is made. And then you say the criteria for that selection were derived from the questions asked by the investigation team within the context of the incident of 3 July. Can you elucidate this? What questions are you referring to?

The team asked us, among other things, to examine what the mercaptans were, the composition of the mercaptans.

But are you referring to questions that were addressed in the investigation report, or were they questions that were asked in the meantime?

Can I see it one more time? Yes, in fact it is very broad, because they deal with the substances that are relevant for the questions that were asked.

But what I asked is, what questions are we talking about at the time that you write this? Are these the evaluated questions?

These are still the three principal questions.

Further to questions from counsel Verbruggen:

If you say that it concerns complex material, can you tell us what you mean by this?

In this instance I can say that it is almost impossible to get the composition entirely clear. That is one side of the story. On the other hand, as it arrived in Amsterdam in slop tanks it is simply a mixture of oil and water. So this already makes it complex. My first question therefore, when we decided on the analytical approach, was: "Are we going to mix everything together and then look what it contains, or are we going to examine everything separately?" It also turned out very quickly that the acidity was extremely high, in other words, that the material was basic. In order to conduct the investigation you usually have to take some action to get it back to neutral, which affects the material. What made it even more complex were the contaminations on the outside, when it came in. The merest mistake and the lab would have to be vacated, because the stench was incredible. So merely the technical approach of the investigation was already complex. But if you just consider the composition, it contained so many different components that if you really wish to quantify it, it will cost a lot of time and money.

I see in the report a mention of a pH value. On page 3 of your preliminary interim reports (section 9.20 page 6014).

That has undergone some changes. I mean, in the way this was written down.

Can you clarify this?

Let us say, if you have clean water and you add a strong base and you obtain this pH value, it is quite extreme, because it is higher than 14. It is possible to have a pH higher than 14. It is an extremely high acidity, and all that you can do is determine the concentration of hydrogen ion. At a hydrogen ion concentration of 10^{-7} it has a logarithm of 7 and a pH of 7. That is neutral water. But there are also concentrations imaginable of 10^{-15} instead of 10^{-7} . If you then make the same calculation, you obtain at the base side a value of higher than 14.

Could you explain pH >14 for me, please? What does this value signify?

That the material is extremely basic.

You say, it has undergone some changes?

The representations in the report are different. Afterwards, it was stated what is needed to neutralise this to pH 7. This was done because the material contained salts. This gives a buffering effect, which you must take into account.

Further to questions from counsel Swart:

You stated that there had been a lot of discussion about the phenols. Can you clarify this? Specifically what these discussions were about?

I think this was also mentioned in the report. It was determined, using the methods we apply ourselves in the lab, that the material contained phenol and all kinds of other phenols. There is a method to quantify these. We nevertheless had a look at them, to see if we could give numbers for the various groups of substances. We did not succeed in doing so for the mercaptans. So this was reported as a sum total. In the end this is also what we did with the phenols. The discussion centred on the fact that the internal investigation at the NFI resulted in a certain level. The lab to which we had contracted out the quantitative investigation reported zero. If only it had been four instead of zero. But they reported that they were unable to demonstrate it. So we discussed this with that lab, without any result. They had no reason to doubt their result. We gave it to another, certified, lab to do. They came up with a specific percentage, the 4.8% that was reported for phenols. According to Mr Peschier this not only corresponded with his qualitative finding obtained from his chromatography examination, but also with the control sample that he had sent along to guarantee the quality of the external investigation. And that is why that number of 4.8 was ultimately reported.

From which lab did the zero finding come?

Caleb Brett. The report contains an annex of it.

You just said: the stench was enormous. The merest mistake and the lab would have to be vacated. Did you include this, let us say, personal observation, in the second report, with respect to stench complaints?

No.

RECESS

Visit to APS 27 October 2006

Further to questions from counsel Bakker:

Who took the initiative to this visit, the IMT or NFI?

I think it was the team.

You mean the IMT?

Yes. But it could be that I urged the visit, because I wanted to see the situation for myself. I do not recall if I said this in a telephone conversation or during a consultation, but it is always advisable to see the local situation with installations like these.

The report of 29 January 2007: Origin of the substances in the installation of APS

Further to questions from counsel Van der Bilt:

In your report of 29 January 2007 you use the relative quantities of a number of substances (a number of phenols, thiophenols and disulphides) as a kind of 'fingerprint' of the Probo Koala waste in the comparative investigation with the samples taken from the DAF. Is this correct?

Yes.

Do you have any statistic data that support the rarity value of this 'fingerprint'?

No.

Was it possible to apply a form of multivariate analysis (Principal Components Analysis of Partial Least Squares) as is sometimes used when determining the possible source of a contamination?

No.

Is it true that you opted for the substances (a number of phenols, thiophenols and disulphides) as 'fingerprint', after it had already become apparent that there was a correspondence between the Probo Koala/Main VII and the DAF samples?

Yes. I think it was Mr Peschier who did this. It was clear what we could use of the samples. He disposed of comparative analysis results of those three sources, DAF, Main VII and Probo Koala. Thereupon, and this is also stated in his report I think, it was simply determined which substances would already be suitable to carry out that comparison with. In that case it is not very useful to consider substances that are absent in the process in the DAF. For instance the volatile mercaptans. These cannot be considered to begin with. So it is mainly the substances that remain behind in reduced concentrations. It subsequently appears that in each group of substances one pattern is more stable than the other, that it has less variation, than in the other group and the patterns emerging from it.

But it is true that you made that choice after it had already become apparent that there was a resemblance between the Probo Koala and the DAF?

Yes, on the basis of the groups of substances themselves. Yes, that is correct.

But does this do justice to the difference that exist between the sampling?

No, the idea is that the samples that we ultimately received are representative for the location or equipment that was sampled.

Can you elucidate this?

I simply trust that the sample we have in the cooler is representative, as regards composition, of what had been in the various tanks. And if yet other substances are found, hopefully in the DAF, this would make it even more important that you not only make the comparison between the individual substances, but also between the patterns and between the relationships of the various substances within a group. I stated just now that mercaptans had been examined, also by us. It is a known fact that there may be different sources for these mercaptans. In this instance the mercaptans were not used to determine the origin, but you cannot exclude the possibility for the substances for which it does apply, if you look what ends up in the acceptance tank, that it still contains those substances at any moment. This applies to phenol but also for the phenols. But what Mr Peschier examined and reported on is that he found the proportions that are present in the one sample, also in the other. And this results in a pattern and that is very strong. At least, not something you can ascribe to simple coincidence.

But my question was precisely: Does your approach do justice to the differences between the analysis results?

Look, if you would only dilute the material in the Main VII with clean water, there is, in theory, no difference in analytical composition. If the scenario would be that it was diluted with material from tank 9, you can expect to find all sorts of different substances and in that case it is indeed a question to what extent they impact the pattern. But I think he explained all this, that it is possible that Tank 9 already contained individual substances that interfered with the pattern. But the point is that he does indeed find a corresponding pattern for various groups of substances and not for just one group of substances, but for several and for several substances of each group of substances. For one of the two he even formulated it relatively. I do not know if this was for the comparative investigation or for the dilution investigation. I mean that the result that he found is more likely for the one scenario than for the other. I cannot recall just now which of the two investigations this concerned.

Are you familiar with the term 'post-hoc reasoning'? If so, what do you think it means?

Perhaps it would be useful to explain it to me. Is it the same as *Hinein interpretieren*? Reasoning backwards. So, yes.

So what do you think it means?

That is what I am wondering. I am not sure that we mean the same thing.

I ask you, what do you think it means.

It is not a term I often use.

Could it be said, in this instance, that there was a post-hoc construction, because you assess the hypotheses on the basis of the substances of which you already knew that they corresponded with the various samples?

No, because what you initially report as composition is simply that. The best thing would have been if we had been able to quantify the main components. What sometimes happens in other investigations, whereby dilution is concerned as well, and corresponding features, is that the substances it contains form a pattern that is so unique that it is unlikely that there are any other sources for those substances, that no matter what is added on the ground, whatever its origin, you will find the same patterns. It is even smart to take a look at this, if there have been various transports, and to divide the concentrations you have measured with each other to see if you arrive at the same proportion. Because in that event you will know that the material has been diluted. In the one you will find 10 and you have 5 substances. Whatever you do, no matter how you divide them between themselves, you will always end up with a dilution factor 25, or thereabouts. Suddenly, when you are looking for zinc, which can be present in the soil, the proportion changes, because then you will be mixing zinc with zinc and the proportion will no longer be right. Perhaps I am going a bit too fast now.

But it is purely the method you apply, you already knew about the correspondences between the various samples?

Yes. Based on pure composition, but those proportions had not yet been considered. If you do, you will see that for some groups of substances there is a pattern. And Mr Peschier furthermore also looked at the pattern that emerges by means of his analysis technique, because he looked for mass spectra. I think it would be advisable to ask him that himself tomorrow.

Is it true that the mutual proportions of the substances in the various samples was determined by way of a qualitative analysis method?

For the comparative investigation? As far as I know it was never quantified. There are no quantitative data for all those substances.

So it is a quantitative analysis method?

Yes.

Is the qualitative method intended to determine which substances the sample contain?

Yes

Is the qualitative method for determining substances from the 'fingerprint' (p. 48,2.2bl, see also p. 60) in fact suitable for determining the concentration ratio of these substances (a number of phenols, thiophenols and disulphides)?

Not directly, because analysis equipment does react to every substance in the same manner. Which means that you can have the same peaks, but with entirely different concentrations. But because it is a comparison, you get this for both samples or for all samples you compare, so this falls in fact out of the equation.

But does that make it suitable or not?

Well. You get a comparable pattern. And if you would look within the analysis and ask if the two peaks having the same size, or really the same surface, have the same concentration, than this would not necessarily be the case. You would have to verify this. But what you do now: You have obtained the result of two samples in the same manner, and in that event the peaks of these two samples are of course mutually comparable. Because in that event you can do it relatively. Because in that case you would not have to verify. Because if you would do that, you would get concentrations and in the other you also end up with concentrations. And if the peak surface is the same and you get different concentrations, you have a comparison as yet. So in that comparison, the difference between the results you might get, falls out of the measurement. So in this regard you may use this type of investigation for comparison purposes.

After having read the previous questions and answers with respect to the investigation in order to determine whether material from the slop tanks of the Probo Koala was processed in the DAF, I wish to additionally state that the examination of the composition only yields qualitative (sometimes quantitative) data about the presence (concentrations) of substances in the various samples. Practically speaking it concerns the results from analyses using a gas chromatograph that result in a chromatogram: many peaks (that constitute a very global measure for the concentration) set off against time.

When analysing the chromatogram using special software (and expert knowledge), these peaks may be linked to individual substances. Of course, it will be noticed in that event that certain (groups of) substances appear both in the Probo Koala/MAIN VII material and in the DAF (and B2) samples. Additional investigation subsequently brought to light that the mutual proportions in which the various substances appear in the samples provide a comparable pattern for three groups of substances. Other examinations showed that the DAF samples contain substances that are not present in the Probo Koala material.

It is a known fact that the DAF processed material from Tank 9 on 3 July. As acceptance tank for waste water to be treated, Tank 9 will contain very many different substances. The major part of which will not be found in the waste water of the Probo Koala because the waste water in tank 9 has a different origin than that of the Probo Koala water. In other words, it is absolutely not strange that we found differences in composition between the samples of the Probo Koala slops and the samples of the DAF.

As for the correspondences. Given the origin of the slops from the Probo Koala the composition is unique. It is not a product with a more or less standard composition, but waste; created by accident as a result of treatment (lye extraction with and without catalyst) of an oil product that in itself was already a waste product released during the refining of crude oil.

What makes the waste so special is the presence of dozens of different substances divided over various groups of substances, and their mutual concentration ratios. It is highly unlikely that it would be possible to reproduce this mixture by pumping dozens of shipments of waste water, from various sources, into a 1000m³ tank and mixing it. However, it was analytically established for various groups of substances.

Even if shortly before the incident spent caustic from a Dutch refinery had been pumped into tank 9 (of which there is no indication, as far as I know) I think it highly improbable that this would result in patterns that are comparable to those of the Probo Koala waste, because it is not likely that processing various type of crude oil, in completely different refineries, under different conditions (lye concentration, catalyst, extraction time, etc) would nevertheless result in the same pattern of phenols, thiophenols and disulphides.

Further to a question from the Examining Magistrate:

In other words, the method is suitable for determining the ratio's, but not for determining the absolute values?

Yes

After having read my responses on the next pages, starting with the answer to the question from counsel Van der Bilt about the manner of reporting and the Bayesian method, I wish to state that my answers turn out to be inconsistent with and sometimes contradict the Bayesian theory. The Bayesian theory does not say anything about the probability or reliability of the hypotheses, but only looks at the evidentiary force of the research results. If research brings unique characteristics to light of the examined material, the evidentiary value of the results is high. In that event it is reported that the findings (results) are (much more) probable if hypothesis 1 is correct than if hypothesis 2 is correct.

Further to a question from counsel Van der Bilt:

In your report of 29 January 2007 you give an estimate of the (relative) probability of the results of the examination when assuming twee hypotheses (see, inter alia p. 57). Is it correct that you assume of both hypotheses that they are correct and that you subsequently estimate in both situations the chance that you get the research results that you obtained?

No. After having read my statement I state that my answer should have been yes.

Can you explain why this is not so? I am referring to the hypotheses on page 57 of the report. I hold this up to you.

The point is that you carry out research to find out, on the basis thereof, if one of the two is more probable than the other.

But was your starting point then?

The idea is that you cannot make a statement on the quality of the evidence as such. But that you say: I have two hypotheses and I have my results and for which hypothesis do these results provide the best support?

But that means really that you accept both two hypotheses as being true?

In the end, we do not make any statements on the subject, but we offer to the court: "There are two hypotheses, we have carried out research and if you look at the results, we think that the research shows – and Mr Peschier attaches a certain degree of probability to it – we think that one hypothesis is more probable than the other".

But in that case you do say, don't you, that you have hypotheses and data and then you consider which of the two hypotheses the data fit in best, hypothesis 1 or hypothesis 2?

Yes, I think that is how Mr Peschier phrased it.

But in that case, the answer to my question is yes, isn't it?

That you accept it as true? That is one way of putting it. We do not make absolute statement on the hypotheses.

It is in fact a sort of reasoning backwards, if I understand you correctly. You have a result, and you look with which hypotheses it fits in best?

No, what it emerges from is that the value of technical evidence is to a considerable extent determined by the context of the matter, by the hypothesis. Personally, I always find it too easy that, when a beach is contaminated with oil and it happens to fit in with the first ship that sails past, even though ten more were in the vicinity, you do not consider the other ten. Sure, you can find a correspondence, but if you had considered the other ten as well, you might have found three other ships of which the oil was of a comparable composition. So the value of your evidence depends on the number of ships that sail past. That kind of reasoning, what is after all the value of what we have found, depends on the context. All that you can say if you come up with a certain context, is what do the results say.

Was the premise of hypothesis 2 that the components in the samples of the DAF did not come from the Probo Koala?

That is correct, Yes.

The ratio between these two chances you subsequently represent verbally as 'much more probable' under hypothesis 1 than under hypothesis 2. Is that correct?

Yes.

In the elucidation of hypothesis 2 (stated briefly: the components found come from a different source than the Probo Koala) on page 58 it is stated that although acceptance tank 9 did indeed contain components that were also found in the Probo Koala, it "cannot be excluded that these components come from the Probo Koala/Main VII as well. How does this elucidation relate to the premise of hypothesis 2: The assumption that the components do not come from the Probo Koala?

In Tank 9 substances were found, and it also had a profile, a pattern, that correspond with material from the Probo Koala. The point is that between 3 July and 10 July all sorts of activities took place in Tank 9. You end up in a circular argument. In that case it will come from the DAF or from what was not yet B2, but also from rinsing the Main VII, I think. So that might be the reason that it contains that material. But it is also possible, since it is an acceptance tank, that other parties have offered material that contained for instance mercaptans. Only those patterns are, if I remember the analysis report correctly, still comparable. Which is not so strange, because so many things happened with that tank.

When reading the elucidation, it states: "it cannot be excluded that these components come from the Probo Koala/Main VII as well." The premise is the assumption that components did not come from the Probo Koala. How should I see this then?

Let us say, the combination of substances, in fact. Look, what this is about is tracing the substances in the DAF. Not only the mercaptans, because it also says here: It concerns the phenols, the thiophenoles and the disulphides. These are used in the comparison. Because the mercaptans are removed as a result of the treatment in the DAF. I really do not see the problem. But I think that, since the investigation and this reasoning were made by Mr Peschier, you should ask him tomorrow.

In doing so, do not you underestimate the probability of the results of the investigation when assuming hypothesis 2?

No, you are still faced with the question how the material ended up in Tank 9. If the scenario is that it went from the Main VII to Tank 9 and the material in Tank 9, including the mercaptans, is so specific, the indications are that the material ended up in Tank 9 from Main VII. Thereupon, you also find it in the DAF. This fits in with the process.

In the elucidation on p. 56 (see also p. 58) you state that if as information about the alternative source only a sampling of acceptance tank 9 was available, it was also taken one week after the incident. Is that correct?

Yes, that is correct.

On p. 10 of your report (January '07) it is stated that the samples taken on 10 July are probably not representative for the composition of Tank 9 at the time of the incident. Can you clarify this?

Yes, the idea is the same, but perhaps it was not very clearly formulated. In the course of the investigation it became increasingly clear what happened with the several tanks, but especially with Tank 9 before Tank 9 was sampled.

What became increasingly clear?

I remember that it was stated in the log, but also in the reports, that cleaning of the installation started immediately after 3 July. Initially you simply take note of it and do not act on it. Afterwards, and especially when we received transcripts for the second investigation in which this was further detailed, it turned out what exactly had been done with the DAF, the empty Main VII tanks and the B2 tank and of which part was transferred to Tank 9 before 10 July. But there already were several indications for this when we wrote report 1.

In your opinion, did you have sufficient data to estimate the probability of the results under hypothesis 2?

It is better to ask Mr Peschier this question. *After having read my statement, I wish to answer that it is not possible to give an absolute answer for both hypothesis 1 and hypothesis 2, as there are not sufficient data. Based on the unique combination of substances and concentration ratio's Mr Peschier believed he was able to conclude that the results would be much more probable in the event that hypothesis 1 was correct than in the event that hypothesis 2 was correct.*

Did you take this into account in the qualification "much more probable"?

That is the problem of the Bayesian formulation, I think. You look at the scenarios and in this instance the scenarios are a bit of everything or nothing at all, in the sense that if the source of the substances on which you base your comparison is coincidental, the patterns will be as well. So if you look at the result, the answer is: "It is much more probable that it comes from the mixture of the Probo Koala in which you have detected the same patterns". So there is much more support for that hypothesis than for the hypothesis that it was coincidental. It is a bit like throwing dice with 100 dice and thinking that 1 will always come up.

But did you take that into account, in the qualification of "much more probable"?

I think this is not the proper question, if I may say so. Because I have the impression that a question is being asked about the qualification of something for which the Bayes is not relevant.

Further to a question from the Examining Magistrate:

The report does not state very much about how the comparisons work exactly. I know that the NFI publishes a lot of material on this subject, but these are not included in the case file. Perhaps you can explain to us something about the technique of comparison and the classes of probability that are applied?

Increasingly, for years now, it is endeavoured to arrive at uniform classes of probability. But until some years ago, it was so that the probability constituted a statement on the evidence itself. The evidence is probable or highly probable, that is the quality of the investigation itself. In the Bayesian statistics new scales were made, which I think Mr Peschier has used, and the idea is to answer all these questions in accordance with Bayes. But it is still very difficult.

Further to a question from the public prosecutor:

Can you give us an example of a Bayesian answer?

What I just mentioned, about oil washing up on a beach. It is contextual. You can carry out a thorough investigation and determine that the cargo corresponded with what was washed up on shore, that the material is the same if you place the chromatographic images on top of each other. But if there were four ships sailing by and they all carry the same cargo, from the same producer, the comparability means nothing. So if you are asked to make a statement with such probability, you get a very low probability, because you do not really know from which ship it came. All you have is the analysis result.

Further to a question from the Examining Magistrate:

Where does one find “much more probable” in this scale?

I think he included a table. In my copy on page 59 of 63. This is the relative formulation. So he has it as much more probable under hypothesis 1 that it came from the Probo Koala, than under hypothesis 2. And especially: it is much more probable that the patterns correspond under hypothesis 1 than under hypothesis 2.

Further to questions from Van der Bilt:

On p. 58 you list four 'uncertainties'. This is followed by: "It was decided not to analyse these samples (...)" Who decided not to analyse them?

It was never really decided to actually examine them. Delivering these samples was one of the agreement reached during the consultation of 18 July 2006. In order to be able to say whether Tank 9 contained any material from the Probo Koala and to say something about the statistics of how often does it happen that it contains these substances, you might examine these acceptance samples.

When we saw them, we decided immediately: "this is a kind of last resort ". There were 150 samples. Almost all of them samples of small shipments, of 30 ton lorries. 150 different samples that perhaps not as regards substances, but definitely as regards outward appearance looked just as complex, in so far as we were able to ascertain visually. They were almost all of them mixtures of oil, water, and sludge. It would take a year to say anything intelligent about them. So from the very beginning this was not really thought of as feasible. *After having read my statement I wish to add that I took this decision after consultation with Mr Peschier.*

Does this mean that the NFI did not conduct a further investigation after the four uncertainties you mentioned?

Let me see. For the reasons mentioned here, it was clear, really, that there was no point in examining this.

What do you mean with "no point"?

Because all kinds of information is missing. And it is 150 times 30 cubic metres and that is just a rough estimate. Because I cannot say of every sample how large the shipment actually was, but it would still be a fraction of the entire tank.

So these four uncertainties were not further examined?

No. We did not further examine these problems. Further investigation would in this instance have meant: "Determine the composition and decide on the basis of the composition whether you find substances that are also prevalent in the Probo Koala material and try to make a statement on the probability or improbability". That was impossible to do.

But how did you nevertheless arrive at the conclusion that hypothesis 1 was much more probable than hypothesis 2?

Through the pattern.

Again, the pattern?

Yes, finding unique patterns for the various groups of substances in such a tank, decides in this instance the strength of the evidence.

And the fact that these uncertainties were not further examined?

I generalise now for the three groups of substances, each containing five substances. So three groups of substances containing five substances would have to yield that comparable pattern. With all those different origins. I fail to see how that would be possible. I maintain that it is highly improbable that it will happen like this. In the sense that by mixing together what are in fact hundreds of lorry loads you get a pattern that was also found in the Probo Koala material. This is the improbability I mentioned. And that this would subsequently be found in Tank 9 like this, that chance is really quite slim. Actually, I should formulate it like Mr Peschier did, that the hypothesis is more probable.

Further to questions from the Examining Magistrate:

The groups you used as fingerprint, those phenols, are these often found in organic compounds? In gasoline or oily compounds?

I believe normal fuels no longer contain such substances. Not in ordinary gasoline. They are in fact removed from them.

Take a waste treatment company such as APS, in what type of products would I be likely to find phenols?

That is a very general question. It is found in carbon and tar-like stuff. It can be found in anything that is related to refining. Disulphides are in fact mercaptans added together. That is what makes this stuff so specific. And that really is the material from the Probo Koala. If I think of another source, perhaps the production of phenol. That would be a possibility. But I do not know if disulphides are actually formed during this process. I would not know about thiophenols. But if you think of the treatment of carbon, which also contains sulphide, to produce a fuel, these substances would probably be released as well. And all flows from refineries, especially the waste produced in refineries.

Do you know if any of those waste flows were treated in the DAF at APS during that period? I cannot well imagine that this would have been the case with tar?

I do not think they are allowed to take it. In any case, it is clearly stated that a separation must be made, which is what has happened here. First you allow the water in. Water may be treated via this route, and then be discharged to the sewage treatment plant. But oil must be treated in an entirely different manner.

But if it concerns a mixture of water and oil. Are phenols also found in washing water?

I know that substances that contain mercaptans – we never looked at the other substances – that flows from refineries run through the entire country and also end up at APS.

But are these flows also treated via the DAF-installation, to your knowledge?

I assume that if they end up in Tank 9, the water fraction will be processed via the DAF. But I do not know if this is always the case.

Because your colleague very explicitly stated on page 57, that the inorganic examination did not show a clear connection. And reference is made in this regard to mixing that can have occurred with all kinds of different water, just like in your example of the soil.

If I consider what we saw and what APS usually accepted, a lot of drilling sludge, you get all kinds of organic substances which we absolutely did not find in the Probo Koala, but that could have been in Tank 9 on 3 July.

Has it been investigated whether there might be flows that also contain phenols and that as a result might have disturbed the unique pattern of the phenols you found?

That was the underlying idea of those svo 4 samples we discussed just now. One way of determining whether the substances we found might have come from a different source than the Probo Koala, is to examine the incoming samples of Tank 9. In the end we found another way. Because yes, in that event you again have a chance that the pattern you find is based on the accidental mixing of waste flows.

How many samples did you use to make this comparison?

One sample of each source. In other words, of the DAF, Tank 9, B2 and I think the Main VII.

Not also samples taken at various depths and such? At least, I could not find them.

No, but we do not have those.

The Main VII has of course 2 tanks, or rather 4.

Correct.

And of the Probo Koala there are 2 tanks, of which three layers were sampled, if I remember correctly.

At the beginning of the first section of the analysis report it is described how these looked like. Part of what the Probo Koala contained was oil. So that was never brought on shore. Because initially only water was brought on shore. For certain examinations I might ask Mr Peschier whether he has checked those comparisons against other samples of the Main VII. But in any event, it was also established, but I do not remember in what order, that the water from the Probo Koala and the water from Main VII was comparable for all tanks. In the end this is how it was reported.

In how many duplicates is one sample analysed?

What happens in this type of examinations, because it is customised examination, is that consultation takes place on the approach. Next, it is all gas chromatographic research that is accredited. Because this is an adjustment of that procedure, because the comparison is not standard but unique, a separate plan of analysis is made. A so-called BIM procedure with extra quality assurance. Such plan might state, for instance, that certain samples are examined twice. But whether this was the case in this event, I cannot say.

The report of 29 January 2007: the dilution factorFurther to questions Van der Bilt:**In your report of 29 January 2007 it is stated on p. 60 about the analysis of the organic components in the samples from the Probo Koala and DAF: "*Because these are qualitative measurements the data are only indicative for the concentration ratios*". For this reason an experiment was conducted in which the Main VII sample is added and mixed with a sample take from the DAF. Is this correct?**

I do understand what will be the purport of the question, but this is all highly analytical, and that is really Mr Peschier's job. But perhaps I can answer the question nevertheless. It is in fact the same as with the comparison. If you consider the numbers in an absolute sense, it is not possible. But if you consider them relatively, it is. *After having read my statement, I wish to add that questions about the research in order to determine the dilution factor is specialist research that is conducted by Mr Peschier and that for this reason I refer to him to provide an answer.*

But it is true that this is why the experiment was conducted, for this reason?

Yes, that is a specific question about the addition experiment. Through addition, the pattern becomes clearer, I think. But you really should ask Mr Peschier.

Can the experimental set up of this experiment be compared with the process of adding, neutralising, airing, separating and discharging as it takes place in the DAF?

No, absolutely not.

How did you check if the dilution factor you infer from the experiment can be translated to the DAF?

The premise is that you have an inert substance in the water from the Probo Koala, let us say a gold substance or something, something that does not evaporate, does not react, and that probably is not to be found in Tank 9, so something that nobody has discharged before. So you only have that stuff, something that can only come from the Probo Koala material, with a concentration of, say, 10 gram per litre. You add one litre, and you now have 5 gram per litre. The dilution factor is 2. That was the starting point of the investigation. The starting point therefore was: "We can look if we can find any substances of which a likely case can be made that they were inert before the process in the DAF". You now face the question: "Does that apply to those phenols?". Do they not come from Tank 9 or do they not evaporate yet? What Mr Peschier subsequently concluded is that the normal phenol is the most stable. But in fact the whole group of phenols is quite stable, with the dissemination you may expect in this type of examination. It can be said that the resulting dilution factor is 250 plus or minus 40, or thereabouts. Of phenol it is probable that this will react least. So you will be left with 190, rounded of to 200. But because of these uncertainties I subsequently used it in the scenarios with an uncertainty of 2, both ways.

Did you validate the method for extrapolating the sample addition experiment, or did you base it on a method described in the scientific literature?

You should ask Mr Peschier.

What is the uncertainty margin of the outcome?

Again, you should ask Mr Peschier.

You base the dilution factor on a linear extrapolation based on (only) three measurement points.**Is it true that both a systematic deviation (consequently too high or too low) and a deviation due to dissemination is possible?**

Same answer.

You give an estimate of the dilution factor based on the (presumed) specifications of the DAF for the maximum CZV. How does the reliability of this estimate relate to these from the dilution experiment?

I found those specifications of the DAF. I looked at them. If the processing is controlled, because that would also be possible, of course, it will be endeavoured to stay within those specifications. To do so, you need a certain dilution factor. If the process is not controlled, and it has ended up, let us say, in Tank 9 without the quantities being estimated in any way, the dilution factor will be unknown. In that case, this is simply illustrative. Because if you had worked on the basis of specifications – I think it may only be a CZV of 2000 or 20,000 and I think we measured more than 700,000 – it will have to be diluted in a different manner. Anyway, this is all speculation. I myself have considered the dilution factor that would be needed if you would do it like this. If the process is controlled.

Further to a question from the public prosecutor:

What do you mean by controlled?

You keep the Probo Koala material separate, because you know what it is, you know what dilution factor you must apply in order to avoid overloading the DAF. This is one of the quality criteria. Of course, the DAF-process entails all sorts of other things as well.

Further to questions from counsel Van der Bilt

But can you tell us something about the reliability of this estimate compared with the dilution experiment?

You cannot give it a reliability rating. It is more by way of illustration, that if the dilution factor would have turned out to be too low, you would have overloaded the DAF. If it is not controlled, the dilution is a fact, regardless of the question whether you can determine it. It would either have been fine, or the load would have been too heavy, according to these specifications and the CZV level of the Probo Koala material. But I think that it did arise from the fact that I had no scenario and therefore consciously decided like, it may be done via Tank 9 and it may be done via another tank and in that case it is consciously diluted. That may also have been the idea. If it was consciously diluted, you expect that it will fit in with the specifications. Because it would be strange if you overload your own process.

With respect to the dilution factor, you state on page 27 of your report of 29 January 2007 that it was only a spot sample, and that if the waste had ended up in the DAF via Main VII and Tank 9, the dilution factor may not be used to calculate how much Probo Koala waste was processed in the DAF. Is that correct?

Yes.

Can you elucidate this?

Again, there are these two scenarios. If you apply the scenario that it was a conscious action, the dilution, it seems reasonable that the controls were set at some point and that it was said: "We must use factor x in order to avoid overloading the process". And thereupon you stick to it. But if it was pumped in Tank 9, it must first be pumped into it in a certain mixture and it must also be pumped out again. At a different location. How the material that was possibly pumped into Tank 9 was mixed, is unknown. So it must be assumed that the material in Tank 9 is not homogenous. How inhomogeneous, I do not know. But it will in any event result in a variation in the dilution factor. In small quantities, this can be quite extreme. That one moment you still consider part of the Probo Koala material and the next moment it may easily be that what was already in Tank 9. It also depends on how Tank 9 was filled, from the Main VII, with 480 cubic metres, if I remember correctly. I do not know those scenarios.

So would it be possible to calculate the quantity of processed waste that was processed in the DAF without knowing the dilution factor?

Well, it is "one" way. Look, if you have a scenario, you can make an estimate of a dilution if it went via Tank 9, simply by the level of pumping and the characteristics of Tank 9. So you have something like 10 cubic metre diluted 100 times, and this gives you an estimate of what went into the DAF. This is what you need and if not it is sheer guesswork. The dilution factor gives an indication of what it could have been, with that broad dissemination.

But you did use the dilution factor (p. 27 report 29 January 2007) when calculating the source strength as input for the emission model. May I conclude that the dilution factor is still useful because what is concerned here is an "order of magnitude", but that it is not suitable for determining the exact volume of Probo Koala waste that was processed in the DAF?

Well, I did not have a scenario in any case. So the source strength is not really known. The best estimate is the one that is based on the dilution factor, for what it is worth, in that dissemination. As regards the dissemination, I simply chose a factor 2. What might have been a reason for instance to limit it, is that a dilution factor of 400, because it could be that 20 cubic meter had been pumped from the Main VII into Tank 9, means that we are talking about almost the entire content of the tank, because the entire tank measured 8000 cubic metres. And I do not think that very probable.

Can the dilution factor be used here because it concerned an order of magnitude?

The answer is really that I had no scenario. That I wanted to assess a number of scenarios for the question of the risk. Simply to see, if you process material and you choose a random quantity that you do not quite make up, it must be a more or less realistic scenario, if these calculation show those exposures. That was a handle for arriving at a scenario that might have been reasonable. But there are in fact no scenarios for what happened on 3 July.

Does that mean that the dilution factor was not suitable for determining the exact volume?

It is not suitable, the dissemination is too large.

After having read the questions and answers regarding the suitability of the dilution factor to calculate exactly how much Probo Koala waste was processed in the DAF, I wish to add the following.

It is correct that the factor is an order of magnitude measure.

The factor is suitable provided you realise that the amount of processed Probo Koala waste you calculate on that basis is also only an order of magnitude.

In this sense the factor is not suitable for calculating the exact processed volume.

The report of 29 January 2007: the phenols

Further to questions from Van der Bilt:

On p. 22 it says: "All this does not yet exclude an effect of the processes in the DAF may have on the concentrations of the phenols measured. Dissolved Air Flotation after all is meant to remove contaminations from the water. Based on the volatility and the solubility in water of the various phenols in the phenol pattern it is concluded that phenol will have been affected by the processes in the DAF the least." Can you quantify the term "the least"?

I already mentioned something about it just now. If you look at the inorganic compound, the salts in other words, the dilution factors go every which way. If you look at the other substances, the organic substances, these also include substances the dilution factor of which varies from 80 to within 2000. For the group of the phenols this concentrates on between 200 and 300. The question is, do they dissolve so poorly in the relatively short time that they are in the DAF, that they end up in the oil layer and are discharged with the upper layer, which is part of the DAF process? Or is it because they are so volatile? Well, they are not volatile. They are, and this is especially true for phenol - reasonably soluble in water. It quantifies it. No, because in that event we would have had a much firmer number for the dilution factor. So it is just an indication.

Further down, it says on p. 22: "Because it cannot be excluded that the phenol pattern was present in the water of Tank-9 (...) nor that phenol is partially removed from the water by the processes in the DAF (...) a margin of a factor 2 is observed in the calculations of the source strength."

How did you arrive at this factor 2?

I chose it randomly.

Can you exclude that this factor is actually higher or lower?

No.

On p. 62 it says: "Although there is no certainty about the fact that the above-mentioned factors 1 and 2 play a role in respect of phenol as well, it is possible, on the basis of the above-mentioned considerations, to use the average concentration ratio for phenol as most likely estimate of the dilution factor (assuming that the components concerned in the samples of the DAF-installation did indeed come from material in the Main VII)." May it be inferred from this that it cannot be said for certain that the estimated concentration ratio / dilution factor for phenol was correct?

Yes.

The report of 29 January 2007: Miscellaneous:

Further to questions from counsel Bakker:

On page 17 of the report of 29 January 2007 (under 5. Comparison waste water Probo Koala vs. Main VII and Probo Koala/Main VII vs. DAF APS) it says: "Objective of the investigation is to confirm that part of the cargo in the slop tanks of the Probo Koala was pumped into the starboard and port tanks 1 and 3 of the Main VII and to establish whether part ended up, via the Main VII, in the installations of APS." In your view, is there a difference between the objective to confirm that, and the objective to establish that...? It does not seem to be coincidental, as it also says, further on: to be able to confirm and next: to establish. So you again phrase it differently.

I do not remember if it was a conscious choice. But that is in fact what the investigation simply is about, what emerges from the comparisons. Compare the composition and establish whether this or that might be the case. After having read the above, I wish to state that it is nevertheless possible to infer a difference in the two phrasings, although I cannot recall whether I made this difference deliberately. The relationship between Probo Koala and Main VII was already apparent from the tactical information which showed that part of the slops of the Probo Koala had been pumped into the Main VII tanks.

The investigation was conducted to have this confirmed. I do not possess comparable information about the relationship between Main VII and the installations of APS so here the investigation was necessary in order to establish whether there was a relationship.

This difference had consequences for the manner in which the investigation was conducted. That the samples of the Main VII (both the samples taken on the instructions of the police, and those taken on the instructions of APS) were comparable, as regards composition, with the water phase of the Probo Koala slops was established on the basis of gas chromatographic research, and did not really go beyond this. In order to establish the relationship between the Main VII and the DAF (APS installations) additional comparative research (patterns for the phenols, thiophenols and disulphides) was conducted.

But what about the link between the Probo Koala and the Main VII, but also the link between the Main VII DAF. That research question was not different in your view?

No. I do not know how much time has passed exactly between all the analyses, but I may assume that the comparative research was not conducted until the composition research had been virtually completed. And that it was consequently known whether the water that was still present by the way in the other slop tank of the Probo Koala, corresponded as regards composition with that of the Main VII. There were also practical reasons to conduct that research, the comparative research, on a sample of the Main VII and not on a sample of the Probo Koala.

But I notice a difference in questions.

It was not made deliberately.

And it did not have any consequences for the way in which the research was conducted either?

No.

Further to questions from counsel Verbruggen:

Are you kept informed by the investigation team and/or the Public Prosecutor's Office of the developments in the criminal investigation, in the sense that you know what you contribute to, as regards criminal acts and suspects that are the object of the investigation?

Let us say, within the context of the research questions we received, if it emerges from the tactical investigation material that it might be relevant for that investigation, for instance because it forms the basis of a new analysis or because it confirms what we found, I did receive it. But whether I received everything, I do not know. But it is not unusual that they found something and that I have it in my possession.

But you mentioned the investigation under Section 173 Criminal Code. That is rather specific. Does it also apply to other facts, that you know what your research contributes to the investigation?

Let us say, in this instance the matter became a news fact some months later in an entirely different context. So it was hardly possible that it did not become clear. But it was not said who the suspects were and what the charges were; nor was this at all relevant at that stage. At least not to us.

As regards the suspects? Because on the covering page I see the name Amsterdam Port Services B.V. mentioned. How did this come about?

Because of the request, indeed, the first svo.

With respect to the composition of the waste of the Probo Koala. The section that begins on page 11 of the report (section 9.25 page 6407)). In your interim report you state that a selection was made, for which the criteria were based on the questions asked by the investigation team. I can imagine that you did indeed pass on additional facts during your research, as soon as they became known to you. Did this also change the selection of the substances that you examined?

No. We wish to prevent that especially with respect to a sample like this, a discussion ensues like: "Are the parameters the team considers relevant?" We have a standard plan of action for this type of samples, to ensure that we do not miss anything. This selection, the only thing I can remember that might have played a part in this respect is that we did not look at the acceptance criteria anymore and the determinations we should do to test them against the acceptance criteria. I refer to the sediment questions and the flash-point; these were not even carried out. We discussed this earlier this morning, that research was supposedly conducted that yielded results and that these results were not reported. I do not think this has happened.

But have the selection criteria been changed at all between that first report of 5 October or 15 December and the final report of, say, 29 January? Because on 5 October you stated: "A selection has been made for which the criteria were based on the questions of reporting officers".

Yes. With hindsight this was perhaps phrased a bit unfortunate. Because if I look at what we measured, there has hardly been any selection. One might mention more phenols, or look at the other peaks of the mercaptans. But what I remember of the analysis report, what it includes as enumeration, it is already very extensive. More extensive, by the way, than what we reported on 5 October. It includes much more.

But the preceding sentence seems to suggest that such selection had been made, because you write: "Quantification and identification of all substances is not possible due to the complexity, which is followed by the justification regarding the selection.

I do not recall that. But I can say that nothing relevant was left out.

Was anything relevant added compared with 5 October, or 15 December (section 9.20)?

When I looked at the result, I thought that the report seemed to date from the end of the year, rather than 5 October. But anyway, I will have to check this. But the purport of the result was already established. The purport of the result was that it was spent caustic material. The only thing that was still unclear for some time was the composition, which was phenol, and perhaps a matter of interpretation as regards the mercaptan concentration. For the rest everything was included in the final report, for completeness's sake, that Mr Peschier thought relevant. What he had measured.

Before recess you stated: "In the final report we took a somewhat different approach with respect to the pH value". On page 11 of the report I see an acidity with a pH of about 14 (section 9.25 page 6407). But further on, we also see a different approach. Can you elucidate this for us?

I assume that you refer to table 4.2 on page 15 of the report, alkalinity 2,6 mol/l. I hope I can make this clear for you. What it comes down to is that in chemistry we use buffer solutions. Sometimes you have to conduct research into a fixed acidity, because the acidity is decisive for the outcome of the measurement. For this you use buffer solutions. This means that if an acid or base is added to such buffer solution, the acidity will not change. In that respect they are stable. In that event the pH will not tell you anything about how much lye or other material the sample may contain. Because the way in which you establish this may be disturbed by the buffer working of the material, and a buffer working is what you usually get if there is a combination of acids or bases with salts. What we have here is bases with salts, so there is a reasonable chance that a buffer working occurs, which may impact the determination of the pH as such. For this reason it is decided to state how much acid must be added to neutralise the sample.

And this is expressed in mol?

In mol per litre, apparently

What kind of unit is a mol?

Well, now we are really digressing. In fact, a mol is particles with a firm number. Depending on the substance it has a different weight. For sulphide, the weight of a mol particles is 32 gram. For hydrogen this is 1 gram. I think what is indicated here is how much mol H⁺ is needed to neutralise the material.

Is that a lot, in comparison, if I may ask?

Yes, that is really very much. Because if you recalculate the quantity of acid that is used to the quantity of sodium hydroxide, you arrive at some 10% sodium hydroxide. Which is a rather concentrated caustic soda concentration.

Does that have a bearing on what you called “the extreme nature”, before recess?

Yes, but actually it was already immediately apparent from the acidity itself. I think it was measured on this basis, from an experiment. I wonder if it was measured using a pH-meter. This acidity is so extreme that you are not even allowed to use the meter for that area. You could even say that a simple pH-paper for measuring the acidity is already indicative, as it will immediately give you a value of 14. If you convert it, it will turn out to be even higher than 14. This is not something we come across very often.

Could you also describe for us the term buffer working that you just used?

What it comes down to is that you select a combination of a salt and an acid or a salt and a base, depending on what you wish to use it for. As a result of basic substances, OH, a mixture in other words that would turn basic through the reaction that would occur or acid that is released, that is countered by that combination of salt and acid, so that the acidity does not change during the experiment. This is what buffers are usually used for.

Further to questions from the public prosecutor:

What you just stated shows that this substance was all the way at the top of the pH ladder. Or extremely basic?

That is correct

That applies in other words to that 10% solution. So even if, because I may put it like this, this is one part lye on nine parts of water?

Yes. It also says here that they concern mass percentages, in the table quantitative (*remark Examining Magistrate: reference is made to table 4.2, page 15 of the report, section 9.25 page 6411*). That is 10 mass percent. The % m/m does indeed signify mass percent. Yes.

Is what I say, 1:9, putting it too simply?

It is 10% mass. In other words 10% of one litre of water. I do not think I have taken into account the changes in unit weight. So that means 100 gram, because it is 10% of the mass of the solution. Or 100 gram of sodium-hydroxide per litre.

Even in the dilution the pH value is this high?

Yes.

In other words, you cannot say caustic soda has such and such acidity, but since it is diluted the acidity will not be that bad. Because if you would jump in the solution, you would jump in an extremely basic bath? Indeed. It is etching, which means you would get chemical burns at this concentration.

Further to questions from counsel Verbruggen:

You continue on page 16 of the report (section 9.25 page 6412): "*Because of the high acidity, the phenols and mercaptans are present in the water in the form of salts: respectively phenolates and mercaptides. This is a consequence of the following reactions with sodium-hydroxide such as lye*". Whereupon you account for this in words I no longer understand. But you do note that it is reversible. For instance by adding acid in the waste water purification at APS. Did you also consider how much acid per unit would have to be added to reverse the reaction?

Yes, but this is, if possible, an even more complicated question. What is written there is perhaps not quite clear for you, that R-OH, or rather the R-SH, that is the mercaptan plus sodium-hydroxide gives R-S-Na, sodium mercaptides. It depends on what R is. In this instance it was established by Mr Peschier that it was methyl-mercaptan, ethyl-mercaptan and those chains are getting increasingly longer and more complex. Methyl-mercaptan is a gas. It is an equilibrium. The proportion between the substances on the right-hand side of that formula and those on the left, it really is a comparison, is in this instance very much determined by the acidity of the mixture. So if you want to very extremely avoid that a mercaptan is created, a gaseous mercaptan that may be created, you are forced to make that pH as extremely high as well. Depending on the characteristics of the substance, it differs for each substance when significant quantities of mercaptans are created if you add acid. It is not the same for every mercaptan. This is the acid balance. These are fixed data for the compounds. I think that for mercaptans this lies somewhere around 10^{-10} . That is, that both sides of the equation are balanced. Which means that you have just as much salts as mercaptan. What you get, then, if you add acid is that you gradually reduce the acidity. The balance shifts to the mercaptans, to the extent that they are gaseous. At that point you can even stop adding acid, because the gas will escape and the balance will be further reduced and the gas will continue to be released. These transition points are each time different.

After having read the above, I wish to add that this has not been measured. Nor would this be possible because the equilibrium constant for each substance and the concentrations of the separate compounds are unknown.

Does the same apply by analogy to the phenols?

Yes, and I believe that it is even more extreme with respect to phenols. Or more extreme, at least about pH 8 or 9. For hydrogen sulphide there are only two, around 7 and 5. And in that event you really must add an enormous amount of acid.

RECESS

Further to questions from counsel Verbruggen

Further to Chapter 6, the Eural coding of the waste of the Probo Koala. Do you possess specific expertise and experience in the field of classifying substances under Eural codes?

Yes.

Do you have any training in this matter and have you gained any experience in it. Can you elucidate?

Questions about, say, classifying waste, waste flows, but especially the sample, the other side, were already being addressed when I worked for the VROM. At that time the regulation was still called BACA, if memory serves. Afterwards we also had BAGA. And the Eural has been in force for a number of years already as well. In nearly all of these periods I regularly worked with these classifications. It is one of the main tasks of my job to occupy myself with this kind of practical regulations surrounding waste.

The provision of the code is that it indeed demands a combination of chemical and legal knowledge, isn't it?

It is indeed so that we are almost never able to determine whether something is waste. It depends on the context. This makes it quite difficult. I do not know if I did it in this instance, but in this instance it was a bit easier, because the material came from slop tanks, which already gives an indication. And there are other indications as well. If not, it is often formulated provisionally. If it is waste and you check whether it is hazardous and it is indeed hazardous, we conclude this and give it a code. If we do not know the origin, it is consequently defined provisionally.

If I see it correctly you have dealt with the several layers separately, even though they were collected from one entity?

Yes, that is correct.

Why?

I stated it in the report in so many words. Look, the premise of the Eural is that the holder of the waste classifies it, because he knows from which installation it came. It is, for instance, possible to come by acid solutions in thousands of different ways. If you do not know the background, it is not possible to classify it. This is often the problem we face, because you only find something that has been dumped somewhere, or a jerry can containing something of which you do not know the origin. But the holder knows the process and can go through the entire scheme. He knows what it contains, in theory, and is consequently able to classify it.

But when I refer to the two layers, a water and an oil phase, you are unable to retrieve it. This means that you can give it the code 99, but you have not done so. You separated the layers and have given them two different codes. This requires an explanation.

Yes. In fact it turns out that when you do this, and you end up at washing water, I can imagine that it will in any event contain some naphtha, or any fuel. But I thought a classification 99, what with what we had found and also if you search a bit further, that in the end, what was it, what I gave it in the end, the 050111, the waste from fuel purification with the help of bases, that you really detect those and that this is applicable to the water. Or rather, the process as we think that we have reported it.

What process did you report?

I do not how it is literally stated in the report. But we formulated that it seemed to come from washing.

I think that what you are saying is that the substance shows resemblance with it, but I have not come across these processes.

To us it has always been clear that the waste flow as we found it, the combination of naphtha, bases and the chemical substances in the water, indicates that it was the result of the refinery process.

It has always been clear to you? You mean from the moment when it was offered to you?

No, from the end of July 2006.

Was that on the basis of information you had received from the team?

It possibly played a part. It is based on the first analyses, in early July. The result and what Mr Peschier probably remembered from a course in refinery processes he had taken, which was found again as the MEROX-process in a course offered by Elsevier. And it fitted in seamlessly. In respect of which it may also be wondered: There are several locations in the refinery where it may be produced, but it also depends how the organic flow is identified. This was not really addressed.

If you separate it into two layers, it makes it possible to classify it in the sense in which you classified it using the codes we find in the report.

Yes.

And all this with the reservation whether it is even possible to give a Eural code to the waste. Because I do not find this reservation and the provisionality, although you did mention it just now.

As it is stated in the report, I believe. It is possible to retrieve the mixture. It is then only a question of whether the process is correct. Because you really work from the other end. You work on the basis of the description and in that description you recognise a composition of which you think, well, this might be the result of that process. But this combination of naphtha-like organic material with all the other characteristics for the water, I could not find. Even though we had a very clear idea where the water might come from, what it pointed to. Whether this may indeed be done like this, this division within the context of the waste legislation, I do not know. But I think it fits in quite well with what we found.

After having read the questions and answers with respect to the EURAL classification I wish to state that I have very little to add to the report. The Probo Koala waste water is a mixture that partially consists of an organic layer that shows a resemblance with naphtha, and a water layer consisting of "spent caustic". Although the mixture is not to be found in the Eural list, I still believe, as I also stated in the report, that giving it a code 99 does not do justice to the fact that a description can be given of the waste as a mixture of two well-known waste products.

Let us now proceed with the MARPOL. If I remember correctly, you stated that you do not really have any experience or expertise as regards the MARPOL.

That is correct.

Should I understand the conclusion of Chapter 7.3 of the report (section 9.25 page 6417) as I think that you formulate it, that it is a chemical assessment and not a legal classification?

That is correct.

With respect to page 31 and 34 of the report (section 9.25 page 6427 and 6430). You arrive at a conclusion that, if I understand it correctly, is based on a scenario.

Yes.

Can you clarify this a bit more for us than you have in the report? What scenario exactly did you take as starting point?

It was assumed that there was no information available about cubic metres of Probo Koala material, or rather, material from the Main VII, that was processed in the DAF.

Is this purely the water phase, and not simultaneously also the oil phase?

The oil phase was never brought on shore. Or hardly. And not only was it not brought on shore, but there was hardly any in the Main VII either. Look, the only information we had, as regards the order of magnitude, is that 10 to, depending on the information, 20-25 cubic metres was missing when the Probo Koala left Amsterdam. If this is taken as starting point, it has to be concluded that it must be somewhere. But nobody was able to tell us where. So what we just talked about, in another empty tank, or in Tank 9, according to the normal course of affairs for waste water at APS. If it is said of this, not everything will have been processed in the four hours that it was processed in the DAF installation. You do not have to accept it. Nor does it have to have been continuously so, it is all unknown. I just assume: What will happen, according to those models, if five cubic metres of that waste water of the Probo Koala is processed in the DAF for one hour?

Is that a model you developed, or did it already exist?

It already existed.

But specifically developed for this substance as well?

Let's just say, the characteristics of at least methyl and ethyl mercaptan and H₂S, those are included in the model, because it requires an extremely extensive list of characteristics of the substances to make these calculations. But they are included in the software as standard.

Are there any other premises on which this approach is based?

Thereupon the data were amassed that are needed to get an answer from the model. That means that, in addition to the source strength, you opt in fact for the best possible approach of the weather. That means two parameters.

One is the wind speed. Although in itself not unimportant, the wind direction is not important for the approach I decided on. Nor, to a certain extent, is the type of weather, because what it comes down to is: Is it possible that, as a result of a specific action, a too high concentration is reached or that limits are exceeded. So in this sense it is rather flexible. This was incidentally also taken as starting point when filling in the parameters, because the model was prepared for intervention in the event of disasters, to provide fire-fighters and others with some idea how substance that is released may disseminate. This may be done by using statistical data that are collected about the weather conditions on certain days in the Netherlands. It is merely an average. For Schiphol 3 July is weather class B3, or something, and this is the class I used. This is because there is some risk, not much, but I did not use the actual weather class in this report, because it turned out to be class A. If you look at the outcome, a proper estimate of the weather forms one of the most important parameters. In addition to the weather and the wind speed, the altitude may be considered at which the substance is released. In this instance that was the altitude of the DAF, possibly Tank 9. There are various ways in which the material can be released. As an explosion, for instance. This gives one big cloud which disperses. Because it was possible that the material was released for at least four hours, because it was processed in the DAF from 7 to 11 am, I opted for a continuous release. So that was the model I chose. I think those are the principal elements. *After having read my answer, I wish to refer to my report of 29 January, p 28 paragraph 9.2.3 (models) and 9.2.4 (principal model parameters).*

So the waste water was all that was missing when the Probo Koala sailed?

No, in this scenario I stated as worst case not more than five cubic metres, because I did not think it realistic that all material had been processed in those four hours on 3 July.

Five cubic meter per hour?

Well, check 5 cubic metres one hour. Because if 5 cubic metres is processed in one hour, that would make 20 cubic metres. And that would be everything that you were looking for, and I consider that not very likely.

You did not find it likely. Because?

Because that would require a scenario of which tank it ended up in. In an empty tank and or in Tank 9. If it was pumped into Tank 9 and it is considered whether those 20 cubic metres can be got out, I did not want to assume that; it was too extreme. Given that everything is mixed and given everything else that was already in Tank 9.

This is also the approach as described in outline on page 34 of the report (section 9.25 page 6430)?

Together with another scenario.

Am I right if I conclude that the parameters there are taken differently, but that the approach remains the same?

Yes.

Further to a question from the public prosecutor:

In the report of 5 October, of 15 December 2006 (section 9.20 page 6015) it is stated under remarks: *At the measured high pH the substances of groups 2,3,4,5 are present in the form of salt. Is it possible to say in these circumstance that the water layer contained for instance mercaptans and hydrogen sulphide? Should it not be mercaptide and sodium-sulphide?*

Strictly speaking, yes. Because that is what it contains. The samples as we received them contained the salts. But because its balance is shifted as soon as it leaves the jar, or brought into contact with acid, or is diluted, and also because that is the manner in which it is measured and reported, I decided, in consultation with Mr Peschier, to state in the report that it contains such and such amount of hydrogen sulphide. If it would be completely neutralised. But that would then be a condition for its release. It is the same discussion we had internally about the moles I mentioned before. Should you restrict yourself to stating a pH or should you say that it contained so many other substances that perhaps it does not correspond with the actual situation. We indicated what you would need to neutralise it. We considered this very carefully and decided to call it hydrogen sulphide. If I see now how it came out in the open, I think it would have been better if we had called it simply mercaptides or sulphides.

These phenols, thiophenols and mercaptans, are they all sulphide compounds?

No. If you look at page 16 of the report (*remark made by Examining Magistrate: section 9.25 page 6412*) you will see that the mercaptans are sulphide compounds, S-compounds. The phenols are not. The thiophenols are. There is overlap in the type, which is also stated somewhere in the report, when determining the mercaptans. The phenyl mercaptan, where the illustration is added, the SH with a ring, is thiophenol, because it resembles phenol, but with sulphide instead of oxygen. But it is also a mercaptan. So there is always overlap in the determination; it is unavoidable.

Page 16 of the report (section 9.25 page 6412) also mentions naphtha. Is naphtha the same thing as gasoline?
Lighter. That means that its boiling point is lower.

In the literature, is it equated with gasoline? May the terms be used indiscriminately?

I think that happens sometimes, but they are not the same. Perhaps you could ask Mr Peschier.

Could you explain to me the cracking process that is mentioned?

There are several. In the past, crude oil was hardly cracked at all. It was distilled. That means that by increasing the temperature of crude oil, which is very viscous, and which contain the lighter fractions, vapour is produced. This vapour can be removed at the various boiling points, so that various fractions are obtained. Because this left a condensed residue at the bottom, the next step was vacuum distillation. By lowering the pressure the boiling points are reduced, which results in the same process, and somewhat heavier fractions are obtained, but still without cracking. But the resulting residue is even heavier and more viscous. By heating up to extreme temperatures without using oxygen it is broken into pieces. This is called thermal cracking. It is one method for obtaining even smaller pieces of residue, which may subsequently be distilled once more. And the result can be used. A more recent method is doing it with catalysts. It is called FCC. I do not remember what the abbreviation stands for right now. But it concerns a process in which the heavy fractions are put into some machine together with a catalyst and it yields pieces of residue. Those are the two possibilities, very roughly speaking. There are all kinds of subtypes of the cracking process.

You stated that this took place on board of the Probo Koala.

Not the cracking process.

Does washing show any resemblance with the MEROX-process?

What takes place during the cracking process in a refinery is that the light fractions or the various fractions in the light flow contain the mercaptans and the sulphides. If you look at the illustrations, you see that they are indeed shaped like that. You must assume, therefore, that they are included in the material like this, as molecules. If acid is added, you must imagine that these tiny hooks are taken off everywhere and that the material becomes polarised. Now, water is polarised but gasoline is not, so these substances dissolve very well in gasoline, at a point when it is basic. Next you remove the H⁺ and you dissolve it very thoroughly in water. What is done, in practice, is that a refinery flow with this stuff is dissolved in gasoline. If water is added with lye, it becomes polarised which means that it dissolves much better in water. The majority of these contaminations end up in the water fractions which means that the contamination is removed from the future fuel. The MEROX-process means that a catalyst is also used to oxidize the mercaptans and to win back the sodium hydroxide.

After having read the above, I wish to add that the answer is yes. During the refinery process product flows are created that are rich in mercaptans and phenols. These substances are weakly acid. If base is added they change into polar substances, in which form they dissolve easily in water. Therefore, when the product flow is washed with basic water the mercaptans and the phenols move to the water. This water is the spent caustic flow. By adding a catalyst the substances that are dissolved in water can be converted into a-polar substances. Substances that on the contrary dissolve very easily in organic solvents, for instance in part of the recently washed naphtha. As a result of this final sluicing, a clean lye solution is obtained as well as a (relatively) small quantity of highly contaminated naphtha. The merox process, which comprises both steps, produces cleaned lye. The water fraction of the Probo Koala slops consists of spent caustic which is an indication that at least the first step of the merox process was carried out on board of the Probo Koala.

Am I right if I say that the MEROX process is highly controlled, whereas the method for washing used on board of the Probo Koala by pumping it over and letting it settle was a very simple, crude version of the same process?

Let me put it another way. I heard many scenarios of what might have taken place on board of the Probo Koala. That only sodium hydroxide was added, which was pumped around and subsequently separated. And there were other scenarios, using more or less catalysts. This affects the result. But of course it is much less, whatever the process was, with much less control, or so I assume, knowing what I do about what can be pumped around and dosed on board of a vessel. You have a completely different mixture from what you would have in a refinery and the dosage installations are also different. As far as I know, that is, given what I know of the Probo Koala I wonder if the ship was even airtight and that sort of thing.

Was the product that was found (naphtha) properly described, as gasoline or unleaded gasoline?

No, because in the form in which it was found it was not suitable to be used as gasoline.

Further to a question van counsel Verbruggen:

You refer to the fuel gasoline?

Motor gasoline, Yes. The octane number was not right.

Further to questions from the public prosecutor:

What do mean with octane number? Does that make any difference?

It still contains all kinds of substances. Let us say, in such boiling fraction, because that is what it is in fact, the naphtha and gasoline, kerosene, gasoil are generally defined as hydrocarbon with a certain boiling trajectory. The boiling trajectory of naphtha more or less overlaps that of gasoline, but on the lighter side. But there exists heavy and light naphtha. These contain substances you will not find in ordinary gasoline, including the unsaturated ones, etc. These are mentioned in the report. It is rather a lot. This is table 4.2 page 15 of the report (*remark Examining Magistrate: section 9.25 page 6411*). It gives the results of the so-called piona-analysis. And it states, among other things, "unsaturated 36%" which is really very much. To what extent this composition differs from ordinary naphtha, is also something Mr Peschier knows more about.

What is coker gasoline?

That is one method of thermal cracking.

In other words, gasoline produced in a thermal cracking process?

Yes.

And the same if you speak of coker naphtha?

Yes.

Do you know the term sour gasoline? What is it?

The term "sour" usually refers to the presence of those compounds of which I included the illustrations on page 16 of the report (*remark Examining Magistrate: section 9.25 page 6412*). These are, in principle, "sour". These are washed out, reason why the MEROX-process is often also referred to as sweetening. To remove the acid.

Is it possible that if the waste water of the Probo Koala ended up in Tank 9, mercaptans and H₂S were already emitted of into the open air from this tank?

Depending on the degree of dilution and of the acidity that remains. Based on 10 cubic metres and a full tank, or 10 on 10,000, it would be diluted with a factor 1000. Our examples are based on a dilution of 100 to 400. So that is somewhat different. It is possible, in theory, that the acidity drops from 14 to about 11. It cannot be stated accurately. Anyway, the composition of the water is rather complex. So I have no idea what will actually happen. Next, it depends on the equilibrium whether gaseous, stinking substances such as mercaptans are produced. But I do not exclude the possibility that substances, light mercaptans, are released as a result of a shift in balance, caused by dilution in Tank 9. On the other hand, the tank contained 14 meters of liquid. If it will also take place if nothing happens, and it remains in the bottom of the tank, whether it could be released then, that seems to me unlikely. But on the morning that we talked about, around 8, 9, 10, 11, 12 July, all sorts of activities took place regarding pumping liquid into Tank 9. That will cause a movement in the content and I do not exclude the possibility that gases are released as a result.

You checked the installation. Tank 9, is it closed on top?

I have not seen it. I think so.

Further to questions from counsel Verbruggen:

At some point you said, further to a question of the public prosecutor about H₂S, hydrogen and the way in which it was present: Yes, if you see how carefully we dealt with it, we really considered it carefully, and it you see what the press does with it, you say hmmm. Can you elucidate this for me?

In the table we had stated: the sample contains mercaptides, or salts. And in the explanation in the report: but it is ends up in the environment, in other words, if it is treated, or if you do something with it, dilute it, not much is needed to happen before mercaptans are released. But we approached it from the other way. Strictly as regards reporting a result of a chemical investigation, it is more careful to report mercaptides, salts in other words.

After having read my statement, I wish to add that when the pH is reduced, first the mercaptans will escape followed (after a lot more acid is added) by hydrogen sulphide.

And the other would be a sulphide?

Yes, the mercaptides, sulphides and the phenolates.

But you do not write for the press, but for the Public Prosecutor's Office?

No, not really for the press. But as a chemical result it would perhaps have been wiser initially, if you wish to present the results in a table, to mention the phenolates, the mercaptides, and to add in a footnote: but beware what happens if you add acid. And in this instance we did it the other way round.

The report of 6 September 2007 (section 9.53)

Further to questions from counsel De Swart:

How often, to date, have you carried out the type of examination that you describe in your report of 6 September 2007, in which you make a statement, based on the complaints that were received and model calculations, about the extent of the contamination?

As regards this type of question? Never. This was the first time.

What medical expertise was available when the health complaints were recorded?

By?

You received input about the complaints. Were those complaints recorded by a doctor?

No.

Do you know who recorded them?

I think the police did. Let us say, the procedure was that the complaints that came in at the municipality and the province were looked at. The province had two lists and the municipality one, so all in all say a few hundred complaints and all complaints were related to, or made a reference to, health complaints. It was endeavoured to interview all these people and in addition the people were selected who did call in a complaint but who did not specifically mention that they suffered a health problem. From what I have read, these interviews were conducted by members of the investigation team, who either called these people on the phone or went by their houses.

Were you in any way involved in these interviews?

No.

Not even in an advisory capacity?

No.

Were the complaints recorded in a uniform manner?

I read the interview reports; the interviews were conducted on the basis of a standard questionnaire.

And the way in which these reports were compiled?

They were compiled in a standard manner, but I do not know how the interviews proceeded. The same headings keep recurring.

Do you know this report, the value of intervention values of the Health Council? ¹

Yes.

Is it true that the intervention values VRW/AGW/LBW are meant to allow managers and aid workers to quickly assess the risks and by doing so offer support when decisions must be taken in the event of a calamity in which hazardous substances are involved?

That is correct.

The AGW (alarm limit value) is described as "*the concentration of a substance above which irreversible or otherwise serious damage to the health may occur as a result of the toxic effects of the substance.*" Is that correct?

Yes, that is correct.

On p. 9 of your report of September 2007 you write, under table five, in which the AGW contour is located at less than 100 meter from the source: "*It is therefore expected that complaints associated with an exceeding of the AGW, such as headache and nausea, will not occur (except perhaps in the event of exposure close to the source).*"². Am I correct if I infer that you link the prevalence of headache and nausea to an exceeding of the AGW?

Yes. And that contradicts the definition you just read. This description, I do not know if I included it... Yes, table 3 on page 7 of the report (*remark Examining Magistrate: section 9.53page 12545*), it states for VRW/AGW/LBW what is given in the overview of intervention values hazardous substances of the VROM 2006 those endpoints, and for AGW this is headache and nausea. This does indeed contradict the definition. But I based my finding on this, and not on the other definition.

You based your findings on the VROM report 2006?

Yes, it is a booklet, but you can also find this information on the internet.

¹ See *De waarde van interventiewaarden, onderbouwing en toepassing van interventiewaarden voor beslissingen bij calamiteiten met gevaarlijke stoffen*. The Hague, Gezondheidsraad, 2007; publication no. 2007116.

² *De waarde van interventiewaarden*, page 25

You calculate VRW and AGW contours. Isn't it true that in reality there will be a continuous change in concentrations, whereby the AGW concentration will be 10,000 times higher than the VRW concentration?
I do not understand. I do not understand the factor 10,000.

You calculate the contours. Isn't it true that in reality there will be a continuous change in concentrations?
What you will see is that by dissemination of the concentration over a certain distance it gets diluted and consequently that the concentrations become lower. What is calculated with the help of the model, is where the concentration contour would be of a VRW or AGW. Especially with respect to the calculations based on what the people who were interviewed had stated, the point was that they stated to have suffered complaints with some regularity for several days and that the reporting officer linked this to activities that had taken place over several days. For this reason, I decided to base my findings on a continuous release of substances. But not over 24 hours per day. In the end it was something like eight hours per day, for five days. It was rather a random choice. Well, random... It was supported by information I got from the police reports.

So how was that supported, those eight hours, in the model?

I could have assumed, that would have been an extreme scenario, that as a result of all the activities and of everything that was still left in the tanks or in the installation of APS, whatever one does – with perhaps a curve when people are working and depending on the activities, but also if no activities take place – the tanks that still contain material will continue fuming substances. This took place from 3 July to especially 13 July, because afterwards the complaints stopped. So for ten days there was continuous exposure. If you take the scenario of APS, that says that it concerned 220 litres, because that was the question, that would be very very little, as these 220 would still have to be divided. Let us say, the substances that are needed to cause the complaints have to be divided over ten days; ten 24-hour days. This will mean that there is no source strength left. That would not explain where the complaints came from. That is one side of the story. But the actual description of the activities is very general. There is no timeline on which you can see what exactly happened when. So there is no way for me to support it like that either. That is why I assumed that those 220 litres and the contaminations they contained were released in less time, or in fewer days and hours.

Are you able to exclude that complaints that are associated with an exceeding of the AGW of methyl-mercaptan, such as headache and nausea, cannot also occur within the VRW contours?

I have read how these values were arrived at. They are exposures, sometimes based on various models. If not, I would not have mentioned them. If there is any reason to doubt the values and the complaints that are associated with them, there is not much point in using them. Still, and I did mention this in the report, I thought it peculiar that what you would expect as exposure, even if there had been more litres, if you take the exposure to AGW concentrations seriously, that there were no much more complaints. Let's just say, those endpoints, they must be wondered at. What the cause was, I do not know. I mentioned a few in my report. Of course, there was also a clear increase in the specificness of the complaints during that period, which corresponded with the activities, wind direction, etc. So there is a link between the activities at APS and the complaints. But if you see that there were only a limited number of people who complained of headaches, I can indeed not reconcile that with the AGW.

You only use methyl-mercaptan in your calculations. Is that correct?

Yes. But what I really do is that I ignore all differences that there might be between the effects of the mercaptans, and pretend that the level of mercaptans that we had measured was fully released as methyl-mercaptan. That is not correct, because these reports do not yet contain any information about the harmfulness of thiophenol. This was afterwards addressed in a different report and that really is one of the nastiest substances that the material contained.

But that was unknown to you at the time?

I did not find it at the time. That is why it was left open in the other report as well. But with respect to thiophenol, if you assume these values, the AGW and the derivative of it is a factor 25 to 30 or so lower. That is at ppm level, more or less milligram per cubic metres. Whereas with H₂S and other mercaptans you get 20-50 ppm for that limit value of the AGW. So that is rather a difference.

Are you able to exclude the possibility that the complaints recorded by the police were related to other compounds that were possibly released during the "processing" of the Probo Koala waste in the DAF?

I did wonder about it, but anyway. I do not pretend to be a toxicologist in the sense that I would be able to evaluate all that. If you consider the duration, I mean I smelled it myself, if you walk around in it for a few days I can imagine that you become nauseous even though the concentrations are not reached. That is possible. But what that would mean for a possible re-evaluation of the VRW and the AGW, I do not know. But the fact that there might be people who are highly susceptible is taken into account when deriving the values. That it must be taken into account for instance that there are people who suffer from asthma. That might be an indication that the AGW was exceeded. But I have been unable to establish this.

But can it also be possible that the complaints were related to other compounds than methyl-mercaptan that were released?

Yes, but this is really a question about the volatility of the compounds. I remember my reaction when the investigation request was received, that I thought: If the pH in Tank 9 remains too high, nothing can escape, except for the disulphides. And disulphides I have not considered at all, because, as I stated in the previous report, although they are not volatile, they do stink. I do not remember if the other report contains any data about stench limits for disulphides. Anyway, if they are of the same order of magnitude as mercaptans, its volatility is a fraction of that of mercaptan. Which is why they were not considered further.

Is it possible that the cause of the complaints recorded by the police was not related to an exposure as a result of the Probo Koala incident?

It is possible. But the results of the interviews I have seen start on 2 July, I think. On that day the overview shows a gigantic increase. Usually, there are two or three complaints a day. And suddenly there were dozens and they corresponded, as regards wind direction and description of the direction from which the people think it came and of what they smelled, with sulphide compounds and as regards direction the APS. Which is also how it is stated in the police reports. Anyway, that does not exclude the possibility that at that time, since most complaints were reported at about four kilometres from APS, something else was situated between APS and the complaint.

In your conclusion on p. 14 you state that "*it is necessary to be extremely reticent when drawing conclusions*" (section 9.53 page 12552). Can you clarify this? Does this refer to the three points mentioned above this remark?

Yes. They are also mentioned again under the scenarios. But "reticence when drawing conclusions" refers to what is stated above that remark.

In other words, what you state there and the fact that those factors have not been further examined, it is on that basis that you come to the conclusion that one must be reticent when drawing conclusions?

Yes.

Yet, on that same page, you boldly state that it "is not likely that only 220 litre of waste water was the cause for the complaints recorded by the police". How can this bold statement be reconciled with the remark that it is necessary to be extremely reticent when drawing conclusions?

If you look at what we examined, I considered on the one hand that if one processed those 220 litres, where are the limits? They are located far away from where the complaints came from. There is yet another point, which is also mentioned in the report that you held up just now, made by the health council, that really if you change the duration of the exposure with respect to the complaints about the stench, you do not have to adjust the concentration. But I did so. So if in the calculations the exposure was changed from 2 to 4 hours, you should cut the concentration in two, which is a very conservative estimate, because you push the contour further away and that is of importance in the event of a calamity. It is better to peg off a too large area than a too small one. But the report clearly states that it was decided against doing this in such an extreme fashion. It gives a different time scale. For stench complaints it says that it does not really apply and that no matter what the duration in time is, the stench threshold should be kept continuously at 0.005. In this event that would have meant that the VRW contour would have been considerably closer to APS. And even further away from the complaints. And if you do not reach the VRW limit even then, and this is what I have calculated, despite all the uncertainties and given the complaints and the description of the complaints such as headaches, that you think the AGW must have been exceeded, I cannot reconcile that. But the calculation shows for a fact that even the stench limit could not have reached those people if those 220 litres had been processed. And that is why I said, on that basis, that it was simply much more likely that more than 220 litres had been processed. Whereby I have given no thought in my report as to where those 220 litres must have come from.

But that was your basic premise?

Yes. Even though there are some uncertainties about that as well.

Because you state that it came from APS.

I have understood that this was the quantity. It might be that the police reasoned something like, okay, they used a pipe, the length of the pipe is such, and that means 220 litre. It is possible, I do not know. I simply took note of it. This is how the question was phrased in the report.

You have not further investigated the 220 litres yourself anymore?

I have not asked which pipe was concerned and what its dimensions were, no.

Further to a question from the public prosecutor:**In connection with page 13 of the report, under 3 (section 9.53 page 12551). The final sentence is not clear to me. What are you trying to say there?**

All I can imagine is that it has something to do with the source, as you need a source to get complaints about the stench in the first place. At the time when I wrote this, I always assumed that the only way the relevant stench complaints could have occurred, were as a result of mercaptan, in other words, by a reduction of the pH. If it is assumed that this can only take place in the DAF and that the DAF was not in operation after 3 July, I had not the faintest idea where it could have come from, except from the disulphides. But it should be borne in mind that this involves dilution and reactions of the material that might have ended up in Tank 9. Because as soon as transition points are reached, mercaptans may theoretically be released. In this event, if it cannot have been the mercaptans but there were nevertheless stench complaints, it must have been other substances. The sole substances that qualify are the disulphides, even though they are much less volatile. In my opinion, it is now sooner an indication of, if you consider the entire complaints pattern, but that would mean a new question, the pH development in Tank 9 should be looked into. Because I also recall that it was stated that the stench was not only noted in the vicinity of the DAF on 3 July, but also in the vicinity of Tank 9. This is an indication that the pH in Tank 9 was so low and the dilution so high that mercaptans were released.

The expert report of 7 May 2008 (section 9.66)Further to questions from counsel Verbruggen:**Was this for you a report in a different case until now?**

This is a report in a different case. For me.

So the case Trafigura APS is in any event not the same as BROOM 2?

No. This is completely new for me. It might very well be the case that it was received by us within that context. If it says as suspect Trafigura APS, than it is I who put it there. It is two years ago for me. It must be stated like this on the request.

Do you remember what was the reason for preparing this report? Apart from what is stated in the report.
I think that if any vessels arrived with possibly comparable waste on board, washing water, as the Probo Koala material, it would have to be examined again. It is not unusual that we are asked to examine the composition.

Did you receive other samples and have you made other reports within this context?
Not that I can remember. No.

And your colleagues?
No, I handled this case.

This one, yes. But you said: if any vessels arrived with possibly comparable waste on board, washing water, samples, they are compared by us. Could this have happened without your knowledge?
No. Until recently they were all done by me. During my holiday a few of those cases came in as well, at least one; it is handled by a colleague.

How many have there been, in all?
Not more than three, I think. I would have to check it.

But in this order of magnitude.
That is correct.

Do you remember the names of those vessels?
No.

Do you know which vessels were concerned without looking at the report?
No. On case number, no.

Had a line been laid previously, including to the port reception installations in order to organise the sample-taking if vessels with a comparable cargo arrived and that the substances would be sent to you for analysis and comparison?
No, all I know is that if the investigation team, not necessarily the one from Amsterdam, but if an investigation team thinks, remembering what happened with the Probo Koala: "Here we have a ship that reports the presence of washing water gasoline, it might be a good idea to have a look at it", we had cases like that. I do not exclude the possibility either that other laboratories had them as well, because the VROM inspectorate may have made an investigation. But I cannot say for certain.

And to they possess the results of your investigation in order to make the comparison?
Afterwards we never found anything that resembled what we found in the Probo Koala. If that is your question.

The question was whether other might have the results that are included in your report of 29 January 2007, in order to make a comparison?
I do not know. All I know is that I sent the report to the investigation team. Where it might have ended up thereafter, I have no idea.

You did not forward copies of the report of 29 January 2007 to other parties?
Other than the investigation team in Amsterdam, no.

General

Further to a question from the public prosecutor:

What does CZV mean? What does it say about a substance, what may be inferred from it? What does a CZV of 720,000 mg/l signify?

It is a measure of the total oxygen consumption you may find when material chemically oxidises. Assuming that that this takes place in the environment or during a process, this may result in partial oxidation. But it really is a measure for the quantity of contaminated substances, in this instance therefore also all hydrocarbons that may be oxidised away and the amount of oxygen that would be needed. The more contaminated with hydrocarbons and other compounds that may react with oxygen, the higher the number. This is extremely high. It signifies that the material contains an extremely large quantity of oxidisable substances. Oil, in other words. But also the mercaptans and other substances. By level I refer to the level that was reported in the first report, 770,000. This is often set off against the BOD, which often is also relevant. This expresses the quantity of substances that might be oxidised by bacteria, under highly specific circumstances, and that is consequently a lot less, because this process is much slower, or there is no oxidation at all.

If, as a waste treatment company, you receive a substance with such a high CZV level, what will you conclude from it?

That it contains large quantities of chemicals. Heavily contaminated material. Contaminated does not necessarily have to mean harmful, but if it is oil, for example, it means that it contains too much oil or fat that may be oxidised.

Do you know how waste from the MEROX-process is normally processed? Because it will result in the release of spent caustic, I assume?

Let us say, if I have this clear in my head, that during the regeneration of the sodium hydroxide the contamination is transferred to a much smaller quantity of naphtha. So in fact it means that the contamination is concentrated in the naphtha.

So it is in fact exactly the reverse?

Yes, it is a reverse process. There are refineries who can do this, in theory, in their refineries. Which means that it will not be released. Sometimes those sulphide flows, whether these must come from the MEROX is something I cannot say for certain, are turned into elementary sulphide in a sulphide plant. Or perhaps it is incinerated, if you have the disposal of proper purification means. But it used in principle within that refinery itself.

If I understand it correctly, the spent caustic is cleaned again and the caustic soda that is subsequently left can be used again for the same process?

Yes. But there are also companies, or there used to be, because these processes are continuously being developed, that were able to process spent caustic, that used specific businesses to process spent caustic. A comparable process. What they do with the residue is something I do not know.

Read, persisted and signed,

Whereof record.