QUEENSLAND FLOODS COMMISSION OF INQUIRY

Matters concerning the operation of
Wivenhoe and Somerset Dams

Wednesday, 30 March 2011 at 2pm

At level 30, 400 George Street, Brisbane, Qld

Interview conducted by: Ms Lisa Hendy and
Ms Susan Hedge

Also present: Mr Brian O'Donnell
Mr Michael Ilott
Mr Adam Pomerenke

Private interview of Terrence Alwyn Malone

<TERRENCE ALWYN MALONE, interviewed: [2.03pm]

MS HENDY: It's Lisa Hendy. We're here at the offices of the Queensland Floods Commission of Inquiry, and I'm interviewing Mr Terrence Malone, Mr Terry Malone, pursuant to a requirement to attend issued to him by the Commissioner.

Just for the purposes of the recording being made today, I'll ask everyone here, apart from the stenographers, to identify themselves, please?

MS HEDGE: My name is Susan Hedge. I'm a lawyer with the Queensland Floods Commission of Inquiry.

MR MALONE: My name is Terry Malone. I'm principal hydrologist with Seqwater.

MR O'DONNELL: Brian O'Donnell, counsel for Seqwater.

MR ILOTT: Michael Ilott, solicitor for Seqwater.

MR POMERENKE: Adam Pomerenke, counsel for Seqwater.

MS HENDY: Thank you.

Q. Mr Malone, I just wanted to start by running through your statement and there's a few matters I'd like to go over with you. First of all, on page 1, you refer to your current position as principal hydrologist at Seqwater.
A. That's correct.

Q. I just wanted to speak to you, first of all, about the first item there under the letter (a), "Reviewing and updating design flood hydrology for Seqwater's dams". When you say "design flood hydrology", is that maximum flood hydrology or is that floods across a range?
A. It's floods across a range from frequent events to extreme events.

Q. And when you say "frequent events", do you mean what sort of probability?
A. Oh, the 1-in-2 type probability.

Q. And you're also involved in setting up and operating real-time flood models. Is that something you've taken over in the last couple of years or is it something you've

been doing for some years?
A. It's something that I've been doing for some years in my - throughout my career.

Q. And is it the case that, more recently, you've become more involved in relation to the management of the Flood Operations Centre, because I understand it's planned that Seqwater will be taking over the operation --
A. Yes, from 30 June.

Q. And as part of, I guess, the rollover to that, have you become more involved in the training and development side in relation to the Flood Operations Centre?
A. I'm beginning to, yes. We're implementing new software, as indicated in section (d).

Q. Yes, so there's the software issue. I understand there's the investigation of the possible new location for the Flood Operations Centre. What about, over the last year or so, your involvement in relation to training people in relation to flood operations?
A. In what respect?

Q. Well, in your capacity either in relation to your job as principal hydrologist or as a flood engineer.
A. It's mostly been on-the-job training and at times holding training sessions with the staff who act in the Flood Operations Centre, while also providing training sessions with the dam operators - or to the dam operators, sorry.

Q. And I understand, from what Mr Ayre said to us earlier today, that you and Mr Malone have become more involved in that --
A. Sorry?

Q. Sorry, you and Mr Tibaldi have become more involved in that, the training in relation to flood operations --
A. That's correct.

Q. -- over the last year or so?
A. That's correct.

Q. Now, just on the topic of the training and so on - apart from the upgrade to the software, which is covered in your statement and I won't be asking you about, and the plans in relation to - or the investigations in relation to

possible new facilities for the Flood Operations Centre, are there any other sort of large-scale projects on foot in relation to the Flood Operations Centre?
A. Yes, we're implementing an organisational-wide hydrometric archival database, called WISKI, that's being funded by the Bureau of Meteorology, and that's being put in place by - this year.

Q. What will its functions be?
A. Basically, we collect a lot of hydrometric data - that's rainfall, water level, et cetera, that information. That needs to be stored in a database for future use.

Q. And so this is an upgrade to the current database, is it?
A. It's a combination, yes, of the databases. That's outlined in - no, it's not there.

Q. That's all right.
A. Oh, yes, it is - (f), item (f).

Q. Just one final question in relation to Seqwater taking over, I guess, the management of the Flood Operations Centre during flood events. Is it planned that there will be staffing changes when that occurs, or will the same flood engineers stay?
A. That's still to be decided.

Q. I should actually ask you if you're involved in trying to recruit new staff either as flood engineers or technical officers in relation to the Flood Operations Centre?
A. I will be.

Q. You will be? Not currently, but is there a planned recruitment drive?
A. We're employing some - interviewing tomorrow morning.

Q. I'll just take you to paragraph 27 on page 7 of your statement, which is where you set out your opinion that additional rain gauges should be installed at the bottom of the upper Brisbane catchment. Are there any other, I guess, areas across the catchment where you felt that the data was not as, I guess, fulsome as it might be?
A. Well, in hindsight, obviously the upper reaches of the Lockyer Valley. But, you know, we might put gauges there, and next time the water will go somewhere else, so that doesn't guarantee.

MR O'DONNELL: Q. Sorry, where did you say?
A. The Upper Lockyer, where the flash flood occurred.

MS HENDY: Q. Now, at paragraph 28, you mention that you weren't involved in the development of the agency communication protocol used during the flood event, and you express - well, you state:

> *In my view, it appeared that the technical information provided by the Flood Operations Centre was sometimes not communicated in a sufficiently timely manner to the public because of the requirement for public statements to be made only by designated persons or organisations.*

Can you think of any particular examples that led you to make that statement?
A. Not particularly. It's just based upon the experience that I had with the Bureau of Meteorology and the fact that, during floods, in the Bureau of Meteorology, the persons doing the analysis were authorised to speak directly to media.

Q. Did you feel that it would have been helpful if people elsewhere could have spoken directly to the media?
A. I think, yes, that is the case.

Q. Do you think the flood operations engineers should have been able to, or someone within the organisations involved there?
A. I think that there should be some dedicated resources more closely related to the Flood Operations Centre providing that public information.

Q. And what sort of information do you think it would be useful to put out?
A. Current releases, projected releases, where people can find additional information. There's a whole range, raft of things that didn't appear to me to be very well communicated to the public. But having said that, I wasn't looking at all the public's media sources at the time.

Q. No. All right. Do you feel that, I guess, the absence of - or not the absence, but the extent of

information that was put out about the Flood Operations Centre and its activities has contributed to some of the public criticism?
A. I can't really answer that. I'm seeing some of the agency communications, but I'm also aware of all the other information that is readily available, so it's hard to say.

Q. At paragraph 29, you suggest that any changes of substance to the Wivenhoe flood manual in relation to the objectives or strategies require detailed engineering and hydrological investigation, and you suggest that those investigations could take in excess of one year. Could you give me an outline, a general outline, of the nature of the inquiries you think might be necessary following this event?
A. Obviously, this event, as being one of the largest on records, we would need to go back and revisit our flood models in light of this new information. When we review the flood models and if there is substantial change, we would have to go back and re-look at our design flows. Then with a new set of - perhaps with a new set of - if we have a new set of design flows, we would then need to go back and revisit the way we operate the dam.

The dam manual is predicated on a series of design flows and recorded flows. Obviously, this one is now another data set we can use to refine that process. Now, to do that takes - the last substantial review of the Brisbane River flooding was in 1991, when this system was first installed or developed. It took three years, with a lot of resources.

Q. And do you have a view about the most appropriate agency or agencies that should be involved?
A. I think there does need to be a multi-agency approach. The agencies involved: certainly, the operator, Seqwater as the operator; DERM as the regulator and provider of water resource information; the Bureau of Meteorology as the warning agency; and councils who are responsible for response; and probably emergency services, too.

Q. At paragraph 30(b), you suggest that:

> *the Wivenhoe Flood Manual should provide greater clarity in respect of the concepts and terms such as "predicted" lake levels or lake levels "likely" to exceed or*

"expected" to exceed certain levels.

Could you give me some examples or explain your position?
A. Well, we certainly know, for example, that there are key levels within the manual. Say, if it's predicted to get to this level, we do certain things. It doesn't give you any indication in the manual about lead times, projected lead times, for that prediction or uncertainties associated with a prediction. For example, we know, we can say for certain, Wivenhoe will reach 74 metres in the next 100 years, but that doesn't necessarily mean we should act on it now.

Q. And I understand that with these models, there's a 5 to 10 per cent margin of error usually in relation to the prediction of the actual runoff that will eventuate?
A. Yes. It could be even more in some circumstances.

Q. So your view is that, really, there should be some more attention given to defining those sort of issues, the scope of - I guess the extent of the prediction?
A. I would like to see more clarity in terms of the lead times and uncertainty. So, for example, if we were saying if the lake level is predicted to get to a certain level within X hours with some degree of certainty associated with it, I think that gives you better substance to make decisions.

Q. So when you say "better substance", do you think it would give you a bit more leeway to make decisions?
A. It would probably cut down the lead times but certainly give you more descriptive roles - rules.

Q. Now, at paragraph 31, you state:

My opinion is that the procedures in the Wivenhoe Flood Manual should be solely directed towards flood mitigation and not water supply security issues. By this I mean I do not think Duty Engineers should be asked during the Flood season to alter the Full Supply Level of the dams.

Is that something that occurred during the current season?
A. Not exactly, no.

Q. Are you talking about what happened in February --

A. Yes.

Q. -- with the proposed release?
A. Yes.

Q. Okay. And can you tell me what approaches were made to you in relation to that reduction to 75 per cent?
A. None.

Q. None. So you found out about it after it was announced?
A. Yes.

Q. And then there was an issue about whether the flood engineers were going to be involved in managing that release, was there?
A. Well, we wanted clarity in terms of how that impacted upon the operation of the dam with regard to the existing manual.

Q. So clarity in relation to, if there's another flood event --
A. What do we do?

Q. -- do we leave it at 100 per cent at the end?
A. Mmm.

Q. That sort of issue?
A. Mmm.

Q. And has that issue been resolved?
A. As far as I'm aware, we are to operate to retain 75 per cent until otherwise directed.

Q. And in your understanding, who would the direction come from?
A. Either the Queensland Water Commission or DERM.

Q. At paragraph 39, I just have a technical question.
A. Good.

Q. Can you explain to me what ongoing or continuing losses are?
A. Okay. Remember when you were a kid and you'd stand under a tree after it's rained?

Q. Yes.

A. And if you could give it a good shake, you'd get awful wet.

Q. Yes.
A. So that rain that's fallen on that tree hasn't got into the system, into the runoff. So that's one type of loss. That's called interception loss. We have infiltration, where rain infiltrates into the soil. We have evaporation, where it's been absorbed back up into the clouds. So there's all sorts of losses, which we have to take into account, and they're lumped together and they're just called "continuing loss".

Q. I have a general question about - and I understand your view, from the statement, about flood engineers operating on the basis of predicted lake levels as opposed to forecast rain - predicted lake levels but on the basis of forecast rain. Nevertheless, the modelling always includes the with-forecast projections. What is the utility of doing that modelling with the forecasts?
A. Yes, it gives us an idea about the possibilities of where we might get to, and, in that way, we can also advise our managers that there's the potential for something to happen, and then the emergency services can ramp up accordingly. It doesn't necessarily mean it's going to happen, though.

Q. Just taking you to paragraph 64 on page 12, you speak there about the model of the Lockyer Creek not being as good. What are the particular issues in relation to that model?
A. It's in regard to the geomorphology of the catchment itself. At the bottom end of the catchment, the river tends to be in a relatively shallow cross-section and it breaks out at relatively small floods and the water starts to go every which way, so that becomes difficult to try to calibrate a hydrologic model to work out exactly how much runoff is occurring in that catchment. The gauges in the Lockyer tend to be at upstream stations, so it's difficult to calibrate a model at those stations, then to know exactly how much water to going to come out at the bottom end. Additionally, the Brisbane River itself backs up into the Lockyer, so we have that added complication.

Q. So is that a situation that you think can be remedied or is that just something that has to be worked with?
A. That's nature.

Q. Now, I wanted to speak with you about your conversations with Brisbane City Council - not necessarily your conversations, but other people's conversations with Brisbane City Council, starting from about paragraph 65 of your statement. Now, when you refer, in paragraph 65, to the conversation with Mr Ayre and Mr Ruffini, I assume that was at the handover?
A. That would have been at the handover at that particular time, yes.

Q. Can you remember anything else they said about what Brisbane City Council had told them at that point?
A. Not really, only that it was suggested that the limit of damaging flows was, in actuality, 3,500, not the 4,000 level stated in the manual.

Q. And did they express surprise at the receipt of that information?
A. I think we all expressed surprise at the receipt of that information.

Q. And did you have a discussion about what you were going to do with that information?
A. There was a suggestion that we try to limit the damaging flows to less than that, and, indeed, we did try to do that, but then circumstances overtook that in a very short space of time, so it became not an issue.

Q. Yes, so was it during that period that the damage rate incurred was received from them?
A. Stage damage?

Q. Yes.
A. Yes, stage damage incurred. I can't recall exactly when that was received.

Q. Now, just taking you to paragraph 67, when you say that you participated in a telephone conference with officers of Brisbane City Council at around 9.38 on 10 January 2011, do you recall who those officers were?
A. No, no.

Q. Were they officers - engineers from council?
A. They would have been officers in the flood information centre within council, yes.

Q. And do you remember anything else about the content of that conversation, apart from them raising that 3,500 limit again?
A. Well, I've got it in the log here that we were expecting, at certain discharge, 3,500 cubic metres a second - we were expecting about 320 homes, or houses, properties, to be submerged and about 7,000 somehow submerged.

Q. That was information received from them?
A. At the time, yes, and that's contained in the log.

Q. And do you remember if there was any other conversation with them at that point?
A. No, no, I don't remember explicitly, but I suggest we would have been talking about the inflows and outflows from the dam at the time and the rainfall and the projected rainfalls.

MR O'DONNELL: Could I ask question? The log on the right-hand side under the heading "Title", where it says "flood officer 8", "flood officer" --

MS HENDY: Yes.

MR O'DONNELL: Q. What does that mean?
A. That was the person who may have been recording the conversation at the time.

Q. Not the person who had a conversation?
A. Not necessarily. I've noticed that in the log, that there is a mixture of persons who have actually had the conversation and persons who recorded the conversation.

MS HENDY: Just so you know, this morning we were given a document by Mr Ayre's solicitors, Holding Redlich, which seems to have a largely unredacted version of the log and it actually seems to include some of the names of the flood officers when they were actually making the calls. Anyway, we will be circulating that when we receive an electronic copy of it. No doubt you already have access to it.

MR ILOTT: I haven't seen that.

MS HENDY: Anyway, we should be getting it later today and I will send it around.

MR ILOTT: That will be very helpful.

MS HENDY: Apparently it has been taken from an Excel document. They have added things into it which are relevant to their client, just cross-referencing paragraphs from his statement. We might use it at a later point to add to.

Q. Just returning to this issue about attempting to accommodate this request to keep the damage down to 3,500 - sorry, the release down to 3,500, I take it that was on the basis that even at that level, 322 houses were going to be inundated and so many more were going to be damaged.
A. Mmm.

Q. In terms of what you actually communicated to Brisbane City Council about what you were going to do with that information, can you remember exactly what you told them?
A. No.

Q. No?
A. No.

Q. What about the gist of what you told them you would do with that information?
A. I think there was an attempt to keep the flows below the limit of damaging flows but, as it transpired, further rainfall in the next few hours overtook that and I think by 3 o'clock, when the situation report was issued, that it was too late.

Q. Did you tell them that you would attempt to keep it below 3,500?
A. Not that I recall.

Q. I just want to take you to the flood event log entries referred to at paragraph 77 of your statement on page 14. The conversation at 4.27pm in the version of the log which appears in your statement, says "BCC returned phone call". This alternate version of the log that I have been provided with today suggests that the original entry is "Ken Morris returned phone call". Does that refresh your memory at all?
A. I know Ken, yes.

Q. At 5.25pm, this version that I have been given this morning indicates that it was Don Carroll from BCC who

returned a call to you. Does that accord with your recollection in relation to the entry for 5.25pm?
A. I would have spoken to both of those gentlemen at various times throughout the whole event, so not specifically.

Q. In relation to the entry at 7.10pm, the version of the log that I have been provided with indicates that the person at Somerset Regional Council who was the contact was a fellow named Tony Jacobs?
A. Correct. He was the primary contact at Somerset Regional Council.

Q. Do you think it was you who had the conversation with him at 7.10pm?
A. I can't be sure about that, and the reason I say that is that that is one of a series of calls, yet the one at 7.20pm specifically says "Engineer 2", so I'm just confused as to why it would have been "FOC" rather than "Engineer 2", so I can't be sure that I made those phone calls.

Q. Independent of the entry in the log, are you sure that you made the call at 7.20pm?
A. If that's what the log says, yes.

Q. But you don't now have an independent recollection of those calls?
A. Not of those ones, but I would be - I suspect that I did make that 7.15 call because I seem to recall speaking to the CEO, advising that we could get potentially damaging floods, but when that was - whether that was that phone call or another phone call at another time throughout the event - I'm not sure.

Q. So are you saying that it is possible that you made some of those other telephone calls?
A. Correct.

Q. Or received some of them, but you just now don't have an independent recollection of that.
A. Mmm.

Q. I am just referring to paragraph 79 of your statement and those entries. Do you have any idea where that figure of 3,000m3/s might have come from?
A. No, not really. I would have more confidence in what the situation reports say rather than the telephone calls.

The situation reports are compiled from model runs and information in front of you. With telephone calls, you might be standing up in another part of the room, taking advice and giving advice.

Q. I assume that you weren't making the entries yourself?
A. No. I would write in the situation reports myself.

Q. But not doing the log entry? No. Is it possible to identify, from keying or whoever's logged in, who was doing the log entries?
A. I'm aware of who was doing the log entries on that evening, yes.

Q. Okay. So is the initials --
A. Yes.

Q. So if they're nominated there as the person doing the entry, they're definitely the person who has done it?
A. Well, as we have discovered, though, that's not necessarily the case.

Q. No. I'm just curious about how this column is generated.
A. So am I.

Q. Okay. I was just wondering if someone had to be logged in to be making entries?
A. No.

Q. It's not that --
A. No, it's not that --

Q. Not that strict?
A. No.

Q. Yeah, okay.
A. There 's a generic log in.

MR O'DONNELL: Q. What's the normal practice for filling out that right-hand column?
A. That's a relatively new practice and I don't think we have a prescriptive instruction as to how you should do it, so it probably depends upon the person who's filling in the log, how they interpret it.

MS HENDY: Q. For example, there's an entry on page 84 -

I know it doesn't relate to you - at 8.50pm:

> *Engineer 1 called BCC to request copy of flood damages curve from 2007 study. BCC will send copy tomorrow.*
>
> *Category: Correspondence.*
>
> *Title: Engineer 1.*

It's not necessarily the case that engineer 1 typed that entry in?
A. Certainly not.

Q. No.
A. No. It would be unlikely.

Q. Just back to this issue about the 3,000m3/s on that Sunday night, is there some other context in which you were discussing 3,000m3/s?
A. There may well have been. I mean, I think we - by that stage, we were certainly considering the possibilities that releases could be ramped up to 3,000 over the next few days and it may be that that number was inadvertently said, you know, by midnight when the caller meant, you know, by Monday, Tuesday. But that's - and the situation reports clearly reflect that was never going to be the case, never a possibility.

Q. I just want to run through a couple of entries in the flood event log, attributed - well, not necessarily attributed to you, but apparently involving you. The first is on page 82 of appendix M at 4.27pm.
A. Now, that's a good example where I've obviously made the phone call or talked on the phone, but it's been recorded by flood officer 1.

Q. This log that I have been given today indicates that the council officer was Ken Morris.
A. Probably.

Q. According to this log, at that stage you're, I guess, forecasting to him that flows in the lower Brisbane potentially might reach 3,000m3/s by next Wednesday or Thursday. Do you remember anything else about that conversation?
A. That seems like a reasonable summary.

Q. At 5.58pm on the same date there's a telephone call. The version in the published report is "Engineer 2 called BoM". The version that I have been given today says "TM called Jeff Perkins (BoM)".
A. Yep.

Q. Do you recall that conversation?
A. Not explicitly, again, but there were many conversations to Bureau of Meteorology to discuss the inflows and potential rainfall.

Q. So what was the purpose of that conversation, from your end?
A. Two-fold: one is to compare our model results and, also, to discuss the forecast for the next few days in terms of rainfall expectations.

Q. Would it have been a long conversation? A few minutes?
A. Probably a few minutes. I worked with Jeff for about 15 years.

MR O'DONNELL: Q. What were the models the BoM was doing?
A. They would have access to numerical weather prediction models, which would have given us forecast rainfall. They would have also had access to the meteorologists who did the interpretation of those models. They're also looking at radar, so they are getting more interpretive information about the potential for forecast rainfall in the next few days from their sources.

Q. So what comparison can be done between your models and the BoM models?
A. In terms of the hydrologic models, they're essentially the same but the Bureau then has access to this additional information about the forecast rainfall by speaking to the meteorologists on duty.

MS HENDY: Q. Because you did work at the Bureau for a long time, were you, sort of, the lead contact person with the Bureau in terms of the other flood engineers?
A. I probably made more contact with them but then I wasn't on shift at the other times, so I don't know what contact they made with them.

Q. On 10 January at 9.55am, the dam operations manager,

who was that; do you remember?
A. Rob Drury within Seq.

Q. What was the purpose of contacting him directly?
A. Oh, we would often talk to Rob, as the dam operations manager, to provide him with our assessment of what was going on, to perhaps explain a few things in the situation report. He was the one who compiled the technical review component for the protocol.

Q. That's the technical reports for the protocol?
A. Yes.

Q. On page 92, there's an entry at 3.49pm for 11 January. Can you tell me anything more about that conference or what the purpose of that was?
A. The purpose was to compare model results and expectations of what would happen in the lower Brisbane River. Both the bureau and Seqwater have models, and it's to provide some inter-agency checking and expectations of what the potential was, or the worst case.

Q. So that was if you had to go up to the 10,000?
A. Mmm.

Q. At 6.07pm - this is on page 93 - on 11 January, there's an entry there:

> *Recap of current release strategy amongst Duty Engineers. Current Wivenhoe scenario: 74.9 m - all gates at 12m. Won't go to 13m settings until level reaches 75.0 m AHD.*

What was the rationale behind that?
A. Well, at that stage, we had only just reached the peak. We had opened the gates up to that level, and we wanted to see if the water level was starting to stabilise, and, if it was starting to stabilise, then it wouldn't have been necessary to increase the gate openings.

Q. There's an entry at 8pm, which, on this version, says:

> *BoM rang. Unofficially, engineer 2 advised that things have stabilised. Also advised predicted peaks at various sites.*

Do you recall that conversation?

A. Again, not explicitly, but I would be happy with the way it's described there.

Q. And when it says, "Unofficially", does that mean - what was that --
A. The context is that - well, there's two issues. I think the "Unofficially" probably refers to the second part rather than the first part.

Q. Okay, yes.
A. You never know that you've peaked until after it has started to fall. So you can't really say that you've actually reached a peak till you start to see the river fall, so that's a bit of a - you know, that's our best estimate. We were thinking at the time it looks like we've reached a peak.

Now, I was also running our back-up prototype model at the same time, which gives us forecasts and predictions of levels down through the river, which the Flood Operations Centre is unable to do currently with the current system, and so I was advising them what I was expecting in terms of peaks at various locations and comparing it with their models.

Q. Was there any huge discrepancy that you recall between the products of those models?
A. Not in terms of discrepancies, but certainly a lot of - both expressing a lot of uncertainty.

Q. There's an entry at 8.55pm on the same date. Can you explain - well, first of all, do you think that is an accurate record of what was said?
A. Yes, I'd be happy with that.

Q. In relation to the sentence:

Engineer 2 advised that we are seriously considering it --

that is, possibly reducing releases --

but this would have little effect on the levels in Brisbane River.

What did that mean?
A. Well, in hindsight, that second part turned out to be

incorrect. By closing the gates as quickly as we did, I think we were able to have a mitigating impact on flood levels in the lower Brisbane.

Q. On Friday, 14 January at 5.37am - this is page 100 - what were Brisbane City Council asking for there?
A. No, I don't recall that conversation.

Q. There's a telephone call at 10.25am. This copy of the log that I was given earlier today indicates that the person from BCC who rang you was Ken Morris.
A. I recall this conversation.

Q. Okay. Can you tell me anything more about this conversation?
A. Only that he was inquiring what the possibilities were of reducing the releases from Wivenhoe to below that figure, and the response as recorded was quite curt. It wasn't like that at all, but I explained that our position was that we had to get the dam back to full supply level within that seven days and that release had to continue at that rate.

Q. Just an issue about who you were rostered on with when it became necessary to have two flood engineers on because of the situation - is there some reason why you were rostered on with Mr Tibaldi, when Mr Ruffini and Mr Ayre were designated senior flood engineers?
A. That's just the way it worked out. I mean, depending on when you were doing your shifts, you had to have sufficient breaks, et cetera, so it just happened to work out that way.

Q. Do you think more than four flood operation engineers are needed?
A. I think we could have lots, and it still wouldn't be enough under some circumstances. I think we managed in these circumstances, but there could be situations where we'd need double the number and other situations where we'd need only one on duty.

Q. I guess it could be the case that there would be more than four, but not all would be rostered on at the same time?
A. Certainly not the case, but they'd also need to be exercising those skills regularly.

Q. The issues associated with North Pine and having to focus on North Pine - do you think that created difficulties in terms of your capacity to deal with the issues at Wivenhoe and Somerset?
A. No. North Pine was dealt with very explicitly and quickly. It's a much simpler dam to operate.

MS HENDY: I don't have any further questions, so we'll conclude the interview now.

AT 3.07PM THE INTERVIEW CONCLUDED