QUEENSLAND FLOODS COMMISSION OF INQUIRY

Matters concerning the operation of
Wivenhoe and Somerset Dams

Wednesday, 30 March 2011 at 10.15am

At level 30, 400 George Street, Brisbane, Qld

Interview conducted by: Ms Lisa Hendy and
Ms Susan Hedge

Also present: Mr Ralph Devlin SC
Mr Toby Boys
Mr Liam Dollar

Private interview of Robert Arnold Ayre

<ROBERT ARNOLD AYRE, interviewed: [10.15am]

MS HENDY: This is Lisa Hendy at the Queensland Floods Commission of Inquiry. I am here today interviewing Mr Rob Ayre from SunWater, pursuant to a requirement to attend issued by the Commissioner. I will just start by asking people in the room - apart from the stenographers - to identify themselves, please.

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

MR AYRE: My name is Rob Ayre. I was the senior flood operations engineer during the January 2011 flood event.

MR DEVLIN: Ralph Devlin of senior counsel. I am senior counsel for SunWater and Mr Ayre.

MR BOYS: Toby Boys, solicitor with Holding Redlich for SunWater and Mr Ayre.

MR DOLLAR: Liam Dollar, junior counsel for SunWater and Mr Ayre.

MS HENDY: Q. Mr Ayre, as I mentioned earlier, I might just run through your first statement, initially, with just a few clarifications there.
A. Okay.

Q. Just starting at paragraph 46, which mentions that as part of your role as senior flood operations engineer, you are involved in the ongoing training of the flood response team members and supervision of the monitoring of the real-time flood operations modelling system. Could you just tell us a bit more about what your role is in relation to the training?
A. Yes. When I became a senior flood operations engineer in 2002 for Somerset, Wivenhoe and North Pine dams, I took on the role of leading the training program for the flood response team and that includes the other duty engineers and the technical assistance, who provide support to the duty engineers in the Flood Operations Centre. We have a regular or annual program of training, which includes a session with the actual dam operators at each of the dams.

Generally, that's been a half to one day session where the dam operators run through the operation of all the

gates and release infrastructure, and then there is a classroom session where we run through the loss of communications procedures specified in the manual with those standby operators.

In terms of the technical assistance, we have run a number of induction sessions for new data collectors. That really is just an exercise, usually a half-day exercise, of running through the real-time flood operations model, with specific reference to the data collection module of the real-time system.

The ongoing duty engineer training really is, I suppose, on-the-job type training where we just run through various parts of the data analysis side of the real-time flood operations model.

Q. Do you develop the training packages by yourself or are other people involved?
A. In the past, other duty engineers have assisted in helping prepare sections of the training packages. I have generally participated, although in 2010 I didn't actually attend the training part of the transition for Seqwater to take over the full operations. John Tibaldi and Terry Malone undertook the training last year.

Q. I wasn't aware of that, but is it planned that Seqwater will ultimately be running the Flood Operations Centre?
A. Yes.

Q. Do you know when that licence agreement expires?
A. It's current till the end of June this year.

Q. Okay.
A. I think there are extensions possible under the current contract.

Q. So, basically, over the last year, Mr Malone and Mr Tibaldi have become more involved in the training aspect?
A. Yes. As part of that transition process, Terry and John have taken more of a lead role in those sort of things.

Q. Have you been involved in recruiting people to be flood operations engineers or technical officers?

A. I have identified people who would have relevant skills and I've certainly encouraged those people to apply to become either technical assistance or, indeed, trainee duty engineers.

Q. And are they people external to SunWater or within SunWater?
A. In some cases they have been external, so they've been either Seqwater employees or dam employees.

Q. Is there, I guess, a program to attempt to recruit people or is it just on an as-needs --
A. Well, I suppose as part of this transition to Seqwater, it's now been handed over to John and Terry to resolve.

Q. Right.
A. But in the past, we certainly tried to maintain a critical number or critical mass of people to undertake that role.

Q. Just in light of the recent events, particularly the January flood events when the four flood operation engineers were, I guess, controlling not only Wivenhoe and Somerset but North Pine, do you think there are sufficient staff or do you think that needs to be looked at, whether there need to be more?
A. I think it would warrant review. There's a tension between having too large a team, whereby you'd lose context during the event, so it would mean that handovers would be far more involved, whereas with the four or five duty engineers, I think there is a good coverage to keep people current with the developments of a flood event.

Q. I guess the other issue at the moment is there's really no-one as a backup either, is there?
A. That's correct, yes, so if one or more of the duty engineers were ill or away, then it would be difficult to --

Q. Replace them?
A. -- certainly resource an event such as the one we had.

Q. Yes. Later in that same paragraph you refer to monitoring the real-time flood operations modelling system and ensuring that the performance of the system is to an appropriate standard. I understand that there is new

software coming and that is being upgraded over the next year?
A. Yes, that's correct, yes.

Q. Leaving that issue aside, in the recent event, were there any issues identified in relation to the performance of the real-time flood operations modelling system?
A. No, I don't believe so. I think the systems themselves were shown to be fairly robust and reliable. There was one occasion were the backup system did experience some file corruption errors - I think that was on the Sunday after the main flood - but, overall, the software itself performed to expectation.

Q. Just before I forget and while I'm on the topic of these sort of review issues, have you identified for yourself or in discussions with the other engineers any surveys or investigations or things of that nature that you think should be undertaken in response to these flood events with a view to, I guess, having best practice in the Flood Operations Centre?
A. Well, from a personal opinion, I think we do need to make ourselves aware of what other data was collected. All the analyses that we have included in the reports so far has been the information collected within Flood Operations Centre. So, I do think we need to broaden the net, as it were, in terms of reviewing what other information was available during the event. So, I think there is a significant post-event analysis required, just to confirm just how adequate the Flood Operations Centre data was.

MR DEVLIN: Q. Can I ask what other information you have in mind?
A. Well, I'm certainly aware of other river height stations and main fill stations that are operated by other agencies, local councils, DERM and the Bureau that weren't taken into account during our modelling, so it would interesting to see just how sensitive the modelling is to that additional information.

Q. Have you any reason to believe that things might have proceeded in a different way had you had that extra information --
A. No.

Q. -- or don't you know?
A. I don't believe so. I think certainly the catchments

upstream of the dams, we have most of those stations incorporated, so I don't believe there will be a big impact. I think more into the metropolitan areas there may be a bit more information there that we don't avail ourselves of.

MR DEVLIN: Sorry, Lisa. Thank you.

MS HENDY: No, that's all right.

Q. Just moving on to paragraph 49 of your statement, you talk about that your previous role included establishment of the flood control centre, as it was then named. Do you know, are there plans to upgrade the whole centre or are there discussions about that?
A. Yes, I'm aware that Seqwater are investigating a new site in Elizabeth Street, I believe, and that they are looking at certain enhancements to the existing facility, more in respect to the collection of telephone information, so the recording of that information so that we're not relying on --

Q. Data entry?
A. -- people to interpret, you know, one-sided telephone calls, and the like.

Q. You don't have any strong views about any other improvements that should be made when the --
A. Well, I believe the facility that we currently have performed well during the events. We didn't suffer any loss of power or loss of communications for any significant periods, so I think the facility itself, as its currently established, performed well.

Q. Just moving on to paragraph 84 of your statement, this is in the context of your discussion of Wivenhoe Dam and providing some background about Wivenhoe Dam. In paragraph 84, you talk about the urban supply compartment that relates to Wivenhoe Dam's full supply level and the temporary flood storage above that. I guess I just wanted to raise with you some of the allegations in the media that the insertion of the fuse plugs has, in some respect or in some way, reduced the flood capacity of Wivenhoe Dam?
A. Yes, I've - well, I don't disagree with - I don't agree with those assertions; I have to disagree. In fact, I think the incorporation of the auxiliary spillway actually increases the availability of temporary flood

storage to us. The original evaluation design flood level for Wivenhoe Dam was EL77 and I recognise that the crest or the first fuse plug initiation level is 75.7. So, in that context, there is a reduction in terms of the permanent storage available. However, the auxiliary spillway is simply another release mechanism for us and enables the dam to handle larger flood events, and the dam can now actually take water levels up to an elevation of EL80. We recognise also that there are impacts of wind and wave setup and for a 1-in-100 year wind event, the magnitude of that wind and wave setup for Wivenhoe Dam is of the order of 2.8 metres. So, I think the overall outcome is that we still have available to us the temporary storage up to EL77 and above.

MR DEVLIN: Q. Could you explain why that is, if the EL75.7 is the - are you saying that's the trigger point for the fuse plug?
A. That's the trigger point for the first fuse plug initiation.

Q. Why isn't that trigger point met and you don't get to 77 or 80? Could you explain that?
A. Oh, we will. So the fuse plug would initiate but we would still be able to have temporary storage higher than that level.

Q. Why is that? Why isn't there water just going out of the dam then and you never get there?
A. Oh yes, there will be water being released but the auxiliary spillway has been designed to handle events up to the 1-in-100,000 AP magnitude, so it is available for those extreme type flood events.

Q. In your view, the blowing of the fuse plug or the engagement of the fuse plug has no implications for the ongoing structural security of the dam?
A. No. The auxiliary spillway is simply another means of us releasing water, so it's an additional facility in relation to the main spillway.

MS HENDY: Q. Wasn't it designed to improve the safety of the dam?
A. Yes, that's - it was part of the --

Q. In response to the upgrades of the estimates of --
A. Extreme rainfall.

Q. Yes?
A. Yes. So it's a dam safety feature. It improves the level of risk for the communities downstream, in that it protects the dam from the larger flood events. So prior to the auxiliary spillway being put in place, the estimated annual exceedance probability of the over-topping failure flood for Wivenhoe was only about 1-in-15,000 AP, so it's provided a significant increase to that level of safety.

Q. I should ask you - the insertion of the fuse plugs obviously led to changes in the manual?
A. Yes.

Q. Did it have any effect, as far as you're aware, on the height of the flood storage - the levels, the strategy levels in the --
A. No. The threshold level or trigger level for evoking strategy W4 has remained at EL74, so that hasn't changed. The requirements for invoking W4 or - and the first - the initiation of the first fuse plug is that we would have all the gates raised by the time we got to an elevation of EL75.7. So it has modified the gate movements or gate sequencing for flows above or for levels above EL74, but it really hasn't changed intrinsically the performance of the dam in that regard.

Q. Just back to that issue about possible improvements to the Flood Operations Centre - at paragraph 140 of your statement, you refer to the flood report considering arrangements for staff accommodation and communication during future flood events?
A. Yes.

Q. Obviously, that was an issue here, because people couldn't get home?
A. Yes, a number of us, the three other duty engineers and a couple of the technical assistants, were isolated from being able to travel to and from home during the event, so we stayed in the building and we were sleeping on temporary bedding, camper stretchers and the like, in some of the meeting rooms, and whilst that was adequate, I think it would be - well, arrangements such as being able to access a local hotel whereby you can have a decent sleep on a bed I think would be useful to counter some of the fatigue issues.

Q. You also mention communication. What was the issue

there?
A. The communication there was simply being able to communicate with family when you're not on shift. A number of the technical assistants - they had houses flooded or, indeed, their streets were flooded, so communications to those guys at certain times became difficult. But I suppose the concern we had also was making sure that people were comfortable with the situation at home so that they could focus on what they were doing in the Flood Operations Centre.

Q. Was there someone available to help deal with those sorts of staffing issues, or was that up to the duty engineers to manage that?
A. Well, I was liaising with members of SunWater's corporate services group, and particularly with respect to some of the building services issues, and we were endeavouring to make sure that staff were able to call home, if necessary. Like I say, a number of the houses lost power, so mobile batteries were running flat, and the like, so --

Q. Sure.
A. So I guess it's just making sure that people are prepared for those sorts of eventualities in these events.

Q. At paragraph 144, you mention that:

> All practical attempts were made to liaise with the Chief Executive's nominated delegate, the dam safety regulator from DERM. During the January 2011 Flood Event there was regular communication with the dam safety regulator.

I'm just curious about the first sentence there. Were there some difficulties contacting the dam safety regulator?
A. No, not necessarily. I think those words actually just reflect the words in the manual.

Q. Oh, okay.
A. We certainly were able to phone Peter Allen and email him throughout the event, although I was aware that Mineral House, where Peter's office is located, did lose power and communications for a time.

Q. Just moving on to paragraph 154, you talk about assisting in the preparation of both flood reports - the flood report for Wivenhoe and Somerset and that for North Pine Dam. Can you tell me a bit more about what your role was in relation to the preparation of the Wivenhoe and Somerset report?
A. Yes. Because I've got, I suppose, most experience with respect to the real-time flood operation modelling system, I spent a lot of my time just organising the modelling results that came out of the system, and with Terry Malone, we were compiling the sections of the report with respect to the event data and the discussion of the real-time flood model performance. Whilst that was our main focus, we also contributed to the other sections in terms of reviewing and adding comments to other elements of the report.

Q. So did you and Mr Malone choose which model runs to include in the report?
A. No, I think that was a discussion between all four duty engineers, so we were all party to those discussions and deciding what we thought were the most relevant for the event.

MR DEVLIN: Q. Rob, was there any particular reason that you can think of now why some models were chosen over others?
A. They were just the most pertinent models which showed the greatest change of action at particular times. There were periods, particularly over the first weekend, where there was little activity, so there didn't seem to be much point in bulking out what was already becoming a very large document with those sort of model runs.

MS HENDY: Q. I just want to take you to paragraph 195 of your statement. This is the section of your statement where you're talking about the overall performance of the data collection system called ALERT. You speak there about the gap in the rainfall gauging data that fell directly on the lakes, and I notice that that's a topic that has been addressed in your addendum statement --
A. Yes.

Q. -- in response to some media reports. Was it you that prepared the modelling that appears in your addendum report, or was that Mr Malone?
A. No, that was Terry Malone who produced that piece of

modelling.

Q. And I understand that he has more of a background in relation to --
A. Well, Terry's background is from the Weather Bureau, so flood forecasting, yes.

Q. When you were speaking earlier about the capacity possibly to check some of the data against data received by other agencies, do you think that's a possible area that can be refined, or is it simply because there are no gauges over Wivenhoe Lake?
A. There's no - not that we're aware of at least, any gauges that cover the 80-kilometre length of lake and specifically the area at the back of the D'Aguilar Range where there was intense rainfall on the Tuesday.

Q. I appreciate that it's not going to be possible to put gauges in the middle of the lake, but do you think it would be prudent to put some extra gauges in the range or --
A. I believe the - well, a number of agencies should get together as soon as they can and review the network to see if, indeed, we can justify that some additional gauges should be incorporated. There's obviously a trade-off in terms of the operation and maintenance of those gauges and the overall ongoing cost to provide that data.

MR DEVLIN: Q. Can I ask, have you struck that situation before in flood events with the dam, that there is that shadow?
A. Not necessarily in that specific area, but certainly in the February 1999 flood and again in I think it was the 2010 floods, specifically up in the Upper Brisbane, on the Jimna Range, we did notice some areas, and Seqwater have taken steps to install additional gauges in those locations.

Q. So it's really dependent upon you being alerted to these things by specific rainfall in a specific area?
A. Yes. Unfortunately, no two floods are necessarily the same, so we spend a bit of time chasing these sorts of things. And I guess the other area of major concern during this flood was the upper Lockyer, where the rainfall just didn't actually fall in any of the gauges to provide us that forewarning.

MS HENDY: Q. There is a reference - I'm not sure if

it's in your statement or in someone else's, sorry, forgive me - about the performance of the modelling in relation to the Bremer being better or - I guess, better in the sense that it provided a more accurate prediction than the modelling from the Lockyer. Was that simply reflective of this issue about the rainfall not being captured or identified in the Lockyer?
A. Yes, I think it's partly in relation to that. Certainly, the rainfall network - the Bremer is a slightly smaller catchment area than the Lockyer and the gauges on the Bremer are better rated and the streams are more confined, so producing models for that area is easier than the situation we have on the Lockyer. The Lockyer has some quite broad flood plains, and we know the Lyons Bridge gauge - there's a breakout upstream of the gauge, so we don't capture all the recorded flows necessarily at that site, so modelling becomes problematic in that sense.

Q. In relation to paragraphs 214 and 215 of your statement, you're speaking there about the uncertainty of forecast predictions. Have you ever been approached or been asked for an opinion about the issue about the full supply level of Somerset or Wivenhoe Dams?
A. No, not in this context, no.

Q. What about in any other context?
A. We only became aware of that discussion post event.

Q. So was that during the February releases or prior to the February releases?
A. Prior to those February releases, yes.

Q. So not from October last year - there was no approach to you as a flood operations engineer or in your capacity at SunWater?
A. No, not at that stage, no.

Q. And what about during February - what was your contact in relation to the decision makers there?
A. Well, we, as a group, indicated that our interpretation of the manual meant that the duty engineers don't have a role in setting the full supply level. That is, indeed, a policy requirement of government and takes into account water security issues as opposed to simply just being a flood mitigation concern. So we indicated that we didn't think we could necessarily make a decision in respect to modifying the full supply level, and

I understand that Seqwater and DERM reviewed the resource operation plan to indeed make the decision about lowering full supply temporarily.

Q. So when you said you "as a group", I assume you're talking about the flood operations engineers?
A. Yes, the four duty engineers, yes.

Q. Were you approached for an opinion, or were you just made aware that this was going to happen and you expressed the opinion in that context?
A. We were approached in terms of seeking our opinion on whether the manual would permit such an action, and we said we didn't think so.

Q. And was that approach made by DERM or was it made by someone else?
A. I believe it was made by Seqwater.

Q. In paragraph 216 onwards, you talk about a paper or a report prepared by you in September 2001 entitled "Feasibility of Making Pre-Releases from SEQWC Reservoirs". Now, when you're talking there about pre-releases, is that pre-releases at the onset of a wet event?
A. At the onset of a rainfall event, yes. This report came out of the considerations of the February 2001 flood. We investigated the accuracy of the quantitative precipitation forecasts, in addition to the operational requirements in terms of the physically limiting time it would take to actually make releases of significant magnitude which would influence events of any sort of interest to the flood operation.

Q. Are you aware of any reports or research done in the last 10 years that expresses a contrary view to that?
A. No. The only other study I'm aware of is the Connell Wagner assessment of the forecasting viability that was done in 2006 or 2007; I can't recall. I don't actually have a copy of that particular report.

Q. Was that done in the context of the spillway upgrade?
A. I believe so. Well, it was done during the period of time when we were in a deep drought. Since I don't have a copy of the report, I'm not fully aware of the background.

Q. No, but I'm aware, anyway, that there were some

studies done about the possibility of increasing the full supply level?
A. Yes, there was an investigation into raising full supply.

MR DEVLIN: Q. Can I just help clarify - you're talking about your study and Connell Wagner being catchment specific?
A. Yes.

Q. Are you aware of studies in relation to other catchments that cover this same topic?
A. There certainly are pre-release strategies used in other parts of Australia and, indeed, across the world. They tend to be in catchments where there is far less variation or variability in stream flow, so particularly snow melt type situations in North America and Europe, so those sorts of strategies are quite viable if you have regular annual stream flow occurrences.

MS HENDY: Q. So not when you're in a tropical storm?
A. In the subtropics, it's a little bit more to deal with.

MR DEVLIN: Q. It's bit different to having so many inches of snow on the ground at the end of winter?
A. Yes.

MS HENDY: Q. All right, I just want to take you to paragraph 229 of your statement. I guess, as an outsider, and looking at it, obviously, with the benefit of hindsight, there seemed to be a lot of people calling in to the Flood Operations Centre, and I wonder if you have a view about whether that affected the capacity of the flood operations engineers to focus on their core tasks?
A. I don't think it necessarily affected us during this particular event. The reason we did actually double team, as it were, with duty engineers from the Sunday evening, was in recognition that, obviously, the larger the flood events, the more people are going to be affected and therefore requiring information or expressing interest in what was going on.

We do try to produce regular communiques during the course of events, and I think we actually met the expectations of the draft protocol that was produced after the October flood in terms of the frequency. I think what

I was alluding to in this particular paragraph was I think all we would prefer to happen is that we produce a single message, which is distributed to all interested parties, rather than have to produce several different messages to a range of different agencies.

Q. I wanted to ask you about - there's situation reports and there's technical situation reports.
A. Mmm.

Q. What was the rationale behind the two sets of reports?
A. The situation reports are something that we have produced in previous flood events, and we used to call them flood advice, and they went to the affected parties named in the emergency action plan and the manuals.

In light of the October 2010 flood and associated with the change in the infrastructural arrangements, with the water grid manager now being responsible for all source supplies, I guess there was an additional layer of agency incorporated in the communications process. So the draft protocol came out, and, in compliance with that, Seqwater nominated Rob Drury to actually act as the conduit between the Flood Operations Centre and water grid manager to facilitate those unfortunately named technical situation reports.

Q. Because they seem to actually contain less technical information than the situation reports?
A. I believe that's true, yes.

Q. So was it Mr Drury that was actually compiling those?
A. Yes.

Q. So the situation reports were going to Mr Drury and he was preparing this other document for the water grid manager?
A. Yes. As I understand it, the water grid manager and DERM had agreed on a format for those reports, and so Rob was taking the information we provided and converting it into the format specified.

Q. Then at some stage, there was someone else ringing up asking for more technical information?
A. Peter Allen did contact us on the Tuesday afternoon, and I acknowledge that the situation reports we were producing during the course of the Tuesday were getting

rather scant in terms of detail, but that was because our operational strategy was actually varying on an hour-by-hour basis, so we weren't able to be --

Q. Summarising it?
A. -- providing too far an outlook, as such.

Q. Has there been some suggestion that the Flood Operations Centre's role should be expanded in relation to the provision of information?
A. There have been discussions subsequent to the flood, involving representatives from DERM and Seqwater, as to the content of such communiques, so it has started to be revised at this point in time.

Q. And what's the general tone of that - that you should be providing higher predictions across the catchment or --
A. Yes, it's just an agreed format or a pro forma that is being looked at at this stage - I don't think it has been agreed at this point - but just specifying the sort of information that should be included in these communiques on a consistent basis.

Q. Something I did want to ask you about those situation reports, at the commencement of them - I'll just get Susan to pull them out and we'll have a look at one of them. Oh, sorry, I was thinking about the technical situation reports where there's a --

MS HEDGE: They're not in there. I've got some on my desk, if you want to see one.

MS HENDY: No, it's all right, sorry.

MR AYRE: Appendix F, so they're immediately after appendix E.

MS HENDY: Here they are. No, it's all right, sorry, I must be thinking about another set of documents.

MR DEVLIN: I suppose if we come back to those, Lisa, the fact that it's Mr Drury's document, of course --

MS HENDY: Yes.

MR DEVLIN: -- we need to know whether he can comment on the content of that.

MS HENDY: No, I wasn't - I was thinking about - yes, anyway, it doesn't matter, because I was thinking about another set of documents where it talks about rainfall over the catchment, and I was just wondering about that product. But it's okay, I'll ask someone from BoM about that, probably Mr Malone.

We might just break for 10 minutes. It is 5 to 11. We'll recommence at 5 past.

SHORT ADJOURNMENT

MS HENDY: We're just recommencing the interview of Mr Ayre at 5 past 11.

Q. I just want to take you to the section of your first statement where you talk about the review of the manuals, the flood mitigation manuals. On page 51, you talk about the last complete reviews of the Wivenhoe and Somerset and North Pine manuals and you mention that you participated in those reviews?
A. Yes.

Q. Can you tell me a bit more about what your role was in relation to those reviews?
A. Well, there were two actual committees, I suppose, or panels that were involved at the time. There was a panel that was looking at the improvements to the real-time flood operations model, and then there was a separate panel that was looking particularly specifically at the review of the manuals. So I participated in both of those panels, providing technical advice, effectively, on how we interpret the manuals and how that would influence the modelling system or modelling platform that was being proposed.

Q. And who was the leader of those? Was there someone running the project?
A. Yes, John Tibaldi was the convenor.

Q. For both panels?
A. Yes, I believe so, yes.

Q. At paragraph 254, you talk about one of the differences in the strategies being the reference to the "predicted" Wivenhoe storage level in the conditions table

at the start of each strategy:

> This change in wording was incorporated to make clear that runoff from rainfall that had already occurred in the catchment area should be taken into account in determining the implementation of strategies.

And that's on the basis that the models that you use in the Flood Operations Centre can make such predictions?
A. Yes.

Q. Was that a clarification of a previous practice?
A. I think that was the case. We have always run on the basis of a no further rainfall forecast or projection, and, in light of, I suppose, the transition to other team members, such as John Tibaldi and Terry Malone, we needed to clarify that point for their benefit predominantly.

Q. There wasn't any particular event or report or anything that led to the change in wording?
A. No, it was just the discussion at the review panels that this made the approach that we adopt when we do the predictions clearer than what had been in earlier versions of the manual.

Q. Now, in relation to paragraph 256, you talk about the outcomes of discussions with BoM and you mention:

> There was some discussion led by the BoM in regards to radar based technology in rainfall measurement (that is, using radar for real time rainfall assessments rather than rain gauges); however, the BoM advised that the research had not matured sufficiently to contemplate using this technology in operations.

Do you know whether that's changed?
A. I don't believe it has changed. The work that the bureau were discussing was the work done by Alan Seed and Phil Jordan. I have reviewed a number of papers that Alan and Phil have produced at a number of conferences, hydrology and water resources symposia, and the like, and effectively they're still indicating that they have pilot studies investigating this, but they haven't actually rolled out that technology in an operational sense as yet.

Q. Now, at paragraph 257, you refer to the discussion by the panel of a study commissioned by Brisbane City Council in 2007 in respect to the threshold of damage for urban areas below Moggill. Which study was that, do you know?
A. I think it was called the Brisbane Valley damage study - or damage minimisation study.

Q. And I take it that the reference to the 4,000m3/s was nothing new at that point?
A. No, the 4,000m3/s has been incorporated in all of the revisions of the manual that I can recall, so that number has been around for a long time and I think it was actually a product of the original design studies for Wivenhoe Dam.

Q. Just on that point, in case I forget, I might just go to the telephone conversations with, I think it's Mr Morris, at Brisbane City Council about this issue about the 3,500 versus the 4,000.

MR BOYS: I think it's paragraph 88 of the second statement.

MS HENDY: Thank you.

MR BOYS: Paragraph 74 of the statement is an earlier phone call.

MS HENDY: Yes.

Q. So that record at paragraph 74 of your addendum statement - was that your first contact with the Brisbane City Council other than sending situation reports?
A. Yes, that was certainly the first contact I had in relation to --

Q. That issue?
A. -- the damages and possible impacts from the releases.

Q. And then at paragraph 88, you speak about a conversation that you had with Mr Ruffini reporting to you about a conversation with Mr Ken Morris from the Brisbane City Council.
A. Yes.

Q. He's the principal hydrologist there, isn't he?
A. Principal engineer, water and environment, yes.

Q. So can you just explain to me - I have some difficulty understanding what the issue was there. They didn't want you to make reference, in the situation reports, to 3,500 being the damage --
A. 4,000, yes.

Q. -- to 4,000 being the damage threshold?
A. So the earlier situation reports that we had been sending out and the one at 9pm on that Sunday night indicated the value of 4,000 being the limit of damaging flows. And my understanding, after talking with John, was that Ken was just making the point that Brisbane City Council staff recognised that damage could actually occur at flows less than 4,000, so he just wished for us to remove the reference to the value 4,000 from the situation reports.

Q. Okay.
A. And John said, yes, we'd accommodate that, but just reiterated we would operate to the values in the manual, which specifies 4,000m3/s.

Q. Sure. So was there actually an attempt, following that conversation, to stay below the 3,500 for some time to accommodate that?
A. Our intention was predicated on the strategies contained within the manual. So at that stage, we were looking at ramping up releases to 2,600 and we were complying with the targets that are specified in strategy W3 of the manual. So, no, we weren't influenced, as such, by that conversation other than we did modify the situation reports to remove the reference to the 4,000 number.

Q. Did you have any further conversations with Mr Morris about that issue or with anyone else from Brisbane City Council about that issue?
A. No, not at that time. I understand, from a review of the log, that on Monday morning John Tibaldi and Terry Malone did speak again with Ken Morris and other Brisbane City Council staff.

Q. But you obviously weren't present for that?
A. No.

MR BOYS: Can I just remind you, at paragraph 386 of the

supplementary statement, this issue that you've just been asking questions about is addressed in a little bit more detail as well. I just wanted to point that to your attention.

MS HENDY: Sure. Oh, yes. I read that this morning.

Q. I just want to take you to paragraph 317 in relation to considerations in the operations of North Pine Dam. It's the first statement, sorry, the addendum statement. I understand that that issue at North Pine was actually a workplace health and safety issue for the operators, apart from anything else?
A. Yes. At the peak of the events, there was water which was shin deep over the platform where the motors and controls are situated; plus, there was water spilling out across the piers. So the operators were, indeed, at risk with that sort of flow occurring around them.

Q. Is it necessary, do you think, to relocate the controls or --
A. Oh, I think, as an outcome of the debriefing for this event, Seqwater are already looking at moving the control systems for the gates from underneath the service bridge. There's the issue of security in terms of access to the controls, but they are certainly making investigations about how that can be done.

Q. Did that create any significant issues during the course of the event for you, in terms of issuing directives to the dam operators?
A. Well, at that stage, the rate of rise in North Pine Dam was very rapid, so directives were being issued verbally and John Tibaldi was actually the duty engineer on shift looking after North Pine on that Tuesday. We were aware that the situation was becoming intolerable for the operators. We were, however, at gate settings of 19 and 20, which is fairly close to the end of the full range that we have, which is setting 23. So, we were certainly contemplating whether we actually just fully lift the gates clear at that point, but, fortunately, the lake stopped rising and the situation then receded, as such.

Q. When you say contemplating just lifting the gates clear, so they didn't have to stay there --
A. Yes, so they - we just fully lift --

Q. -- running through the sequence?
A. Yeah, just fully lift the gates and then the operators could basically just surveil the situation.

Q. Just in relation to those issues with the operators at North Pine, was that an issue that subsisted for a long time or was it just something that ran over a couple of hours?
A. As I understand, the water started going over the piers at an elevation of about EL40. I'd have to have a look at the schedule to see exactly what time that occurred. So it was only a number of hours, as far as I was aware.

Q. At paragraph 352 of your statement, you refer to:

> *The findings of the subsequent modelling for the Wivenhoe and Somerset Dams Flood Report 2011 were that the peak flood height measured at the Port Office gate near the Brisbane CBD would have been approximately 2.0m higher than was experienced had Wivenhoe and Somerset Dam not been available.*

A. Yes.

Q. Who completed that modelling?
A. It was a combination of Terry Malone and myself. As is course in preparing these reports, we try to demonstrate the impact of the operation of the dam by indicating the difference in the performance that actually occurred and looking at a model we have set up which doesn't incorporate the dams. So, Terry ran those models under my review and we came up with an assessment, a post-event assessment, of the likely impact.

Q. Do you know, have they been subjected to peer review or are they going to be subjected to peer review?
A. The models we ran are hydrology models, so they are limited in some of the assumptions incorporated into those models. So, we certainly recommend further detailed investigation using hydraulic models to provide a definitive estimate of the impact of the operations.

Q. Do you know if that is being undertaken?
A. I don't know at this stage, but it's certainly

something that I think would be warranted.

Q. Just at paragraph 404 of your first statement, page 92, you speak there about:

> *There might be an opportunity to improve the communications between the Flood Operations Centre and the BoM during a flood event.*

Were there any particular issues that gave rise to --
A. No. I believe the relationship worked quite well. The focus of that suggestion really is the - we primarily talked to the flood warning centre, so the duty engineers associated with that and, because of Terry's background, he also knows a lot of the meteorological forecasters, so Terry also speaks to those guys on an ad hoc basis. So I think if, indeed, we built in a more regular discussion with the Met forecasters, that we would benefit from just a deeper understanding of what the forecasting situation is at a particular time. So that was generally the - or that was really the focus of that comment.

Q. Did you feel that - I mean, I know that you weren't working on shifts with him, but did you feel that he, in a sense, had better access to the forecasters than you did because of his background?
A. I think so, yeah. It's just that he knows them personally, so it's obviously easier for him to just give those guys a call and communicate with them.

MR DEVLIN: Q. Is what you're saying that it's an opportunity to formalise --
A. Yes.

Q. -- those links, so it doesn't depend on somebody's personal knowledge --
A. Personal knowledge, yes.

Q. -- of someone inside BoM?
A. Yes, of the operations of the Bureau.

MS HENDY: Q. I want to take you to paragraph 410 on page 93 of the first statement, where you speak about a tension between limiting releases from Wivenhoe Dam to below the naturally occurring peak at Moggill and the requirement to drain the dam within seven days, included under strategy W3

of the flood mitigation manual.
A. Mmm.

Q. Could you explain that in a bit more detail for me?
A. So the requirement for the target flow sets an amount of release that is - well, you are trying to maintain or keep below. Now, that's fine. The only problem is what it doesn't recognise is how much water is actually coming into the dam during that timeframe. So with the overarching requirement to drain the dam within seven days, if your naturally occurring flow is only 500 cubic metres per second, for instance, then notionally, under that particular strategy, you would have to maintain releases below 500 cubic metres per second. That doesn't recognise the volume of water that is actually stored in the dam at that particular time. So, when you look at how much water you need to release in the seven days, that value tends to be larger than the naturally occurring float, on occasions. So that's really the tension. Whilst you're trying to limit downstream impacts, you also have to be aware of what's happening upstream in the dam.

MR DEVLIN: Q. I think you point out in the manual that there is an ability to extend the drain-down beyond seven days?
A. There is, and that's based on the general forecast conditions. If it's favourable, as in there is no rain on the horizon, then we may be able to extend that drain-down period.

MS HENDY: Just in relation to this schedule that we have been given this morning, with the initials there, some of them aren't initials that we are familiar with. I was just wondering --

MR DEVLIN: Rob might be able to assist.

MS HENDY: Oh, they're the flood officers?

MR AYRE: Largely, they would be the technical assistants who do the data entry in the event log.

MR DEVLIN: Will it help to put a name to some of them?

MS HENDY: No, no. We have a list of them.

Q. The issue, sorry, is whether - is that the person who

created the log entry in that column?
A. Yes.

Q. We just wanted to clarify that. Just in relation to the flood event log that appears in the report, was it Mr Tibaldi who decided what to include in the actual report?
A. No. We discussed the actual amended event log format, recognising that the gate directives and the situation reports we were treating as separate appendix, so we decided to actually remove those elements out of the event log simply because, again, we just didn't want to repeat all that information if we already had it in another appendix. So we recognise, though, the amended event log does have omissions, so some of the technical situation reports didn't necessarily get included, or reference to them, in the abridged version that was put into the report.

Q. Is it Seqwater that maintains the master log?
A. No, it's maintained in the Flood Operations Centre. So, in accordance with the procedures, when we establish a new flood event, we create a directory structure on the computer servers and, as part of that, an event log is generated as part of that template in a directory.

Q. Is this a complete copy of the log?
A. I think so.

MS HENDY: Or is it --

MR BOYS: I believe it is. We have just taken the event log from the Excel version. We just added, for convenience, the column at the end. There are some extra lines added to this version to show when Rob came into or out of the --

MS HENDY: Sure.

MR BOYS: This version has all the situation reports in it.

MS HENDY: So all of them, not just the ones that are included in the report?

MR DOLLAR: The one in the report doesn't have any situation --

MS HENDY: No.

MR DOLLAR: -- reports in it. The event log that was prepared, some of the situation reports didn't get put in there, and so as part of reviewing this, when that's been noticed, in this document we have provided - if there was a missing situation report, that has been added in there just so that it is in full. This isn't the one that was kept because those missing ones have been added in there.

MS HENDY: Sure.

MR DOLLAR: This is a reference document, it's not the --

MS HENDY: Contemporaneous.

MR DOLLAR: Yes.

MR BOYS: It's purely for the statement.

MS HENDY: I was just curious because we haven't actually seen the original one.

MR DEVLIN: Q. Who controls the log?
A. It will be the flood event manager, who was Terry Malone.

MR DEVLIN: So is yellow when Rob is not in the centre?

MR DOLLAR: Yes.

MS HENDY: There is a reference at 9.30pm on 10 January - 2130 it is recorded as, sorry. It is the last entry on that page.

MR DOLLAR: Is there a paragraph number on the side?

MS HENDY: No, there isn't.

MR DEVLIN: 9.30pm, Monday, 10 January.

MS HENDY: Yes.

MR DEVLIN: Sorry, we dropped off the pagination of this. We're going to get it right eventually.

MS HENDY: 2130.

MR DEVLIN: It says, "Provided Boyd Wilson (ICC) with situation update".

MS HENDY: Q. Obviously - well, by reference to this, it wasn't you who made that telephone call, but did you overhear that conversation?
A. No, I can't recall that.

Q. Moving on to 11 January at 12.15am, and again this isn't noted in your statement --

MR DEVLIN: Is that the one, "Spoke to Ken Morris (BCC) to update on current release strategy."

MS HENDY: That's right.

Q. Again, to the best of your recollection, was it you who spoke to Mr Morris at that time?
A. No, I didn't.

Q. There's another one on the next page at 1.30am, "Spoke to Tony Trace (SRC). Somerset Regional Council..." It's not referred to in your statement, I'm just confirming, to the best of your recollection, you weren't involved in that conversation?
A. No. That was John Ruffini, yes.

Q. There is an entry at 5.15am on the same page. I will just read it:

> *Spoke to Peter Baddiley (BoM) regarding reducing Wivenhoe release to accommodate peak of Lockyer flash flood. Update: consensus was that reducing release from Wivenhoe would no longer be feasible due to attenuation of Lockyer peak and significant additional rainfall in upper Brisbane during the night.*

Again, that is not referenced to your statement. Do you know who made that call?
A. Well, I believe - well, I was aware of the call but I believe it was John Ruffini who actually spoke directly to Peter Baddiley.

Q. When you say you were aware of it, were you there with

Mr Ruffini?
A. Yes, I was in the flood centre at the time.

Q. Did he discuss the contents of the call with you immediately afterwards?
A. I was already aware that we had - well, we weren't contemplating actually reducing the flows now, so I don't think John relayed that to me, he was just advising Peter that that was the case.

Q. So, from your point of view, that entry just confirms that previous view that had been reached by the Flood Operations Centre engineers and that was communicated to Mr Baddiley?
A. Yes.

Q. The purpose of that was to assist BoM with forecasting?
A. Producing flood warnings for the lower Brisbane.

Q. Sorry, I have to be clearer about the forecasting and the flood warnings. At 8.00pm on 11 January, this is another entry that's not referred to in your statement. It reads:

> *Peter Baddiley rang. Unofficially TM advised that things have stabilized. Also advised predicted peaks at various sites.*

Was that a conversation that you were aware of?
A. No, I don't believe I was aware of it at that time. It involved Terry Malone and Peter Baddiley. I know - well, all four duty engineers were in the flood centre at that time.

Q. When there's a reference there to "unofficially", do you have any - that was just like a preliminary view formed by the flood engineers, or was that --
A. Well, the lake had stopped rising or hadn't risen for about half an hour, so we weren't yet convinced it had stopped rising, so I think that was the use of "unofficially". It meant to say that we had fingers crossed but we weren't convinced as of yet.

Q. There is another conversation at 8.55pm between Mr Burrows of Seqwater and Mr Malone, according to the log entry there. Were you in a position to overhear that

conversation?
A. I was aware of that conversation. Peter Burrows was actually calling the Flood Operations Centre quite regularly and, indeed, we - the four duty engineers - at that point in time were discussing the shutdown sequence that we were hoping to implement, so I was aware that Terry was relaying that information to Peter.

Q. There's a reference in that entry to:

TM advised that we are seriously considering it, but this would have little effect on the levels in Brisbane River.

Is that an accurate reflection of the view between you at that stage or is that not - because I don't quite understand what that entry means.
A. No, I must confess, looking at that entry in retrospect, it is a little confusing. I could only express my own opinion that Terry was referencing the fact that we had been discharging 7,450 ^ m3/s at the peak and so that peak flow would actually --

Q. Reach Brisbane?
A. Yes, trans - would flow through the river all the way to Brisbane, yes.

Q. There's an entry at 5.37am on Friday, 14 January 2011:

James C from BCC called requesting information for Wivenhoe Dam and checking sit-rep data. Enquired about flows throughout the event, TM advised that not currently in a position to discuss these.

Was that because gauging hadn't been done?

MR DEVLIN: Q. Have you got an ability to comment at all?
A. I'm just trying to recall the conversation. I certainly wasn't privy to the - directly to the telephone conversation.

MS HENDY: Q. I just wonder what it refers to.
A. Well, it seems a little bit odd because we were providing our actual projected releases to Brisbane City Council, as such, so --

MR DEVLIN: Q. It's not helpful to guess or suppose because somebody else had the conversation.
A. Yes. No, so I don't know.

MS HENDY: Q. So you didn't overhear that conversation?
A. No.

Q. At paragraph 68 of your supplementary statement, as far as we can tell, that's not a phone conversation that made its way into the event log and, as you have identified, there are issues with that event log and I understand that Seqwater is looking at possibly digitally recording phone calls to and from the flood centres?
A. Yes, I believe that's the case, yes.

Q. Is there any particular reason why that didn't make it into the flood event log?
A. Oh, I couldn't comment.

Q. No?
A. I don't know what the situation was at the time when that call was being made.

Q. Can you tell me anything else about that conversation, or is that pretty much the extent of it?
A. All I can recall is that John indicated that the rainfall had occurred specifically in the Stanley River and the Upper Brisbane on late Sunday afternoon. It meant that river rises were looking quite substantial and, given that we had both Somerset and Wivenhoe and, indeed, North Pine all operational, that he just - he thought it was worthwhile us having multiple duty engineers on shift, and I agreed. That followed on from the afternoon meeting where we recognised that the event could escalate.

MR DEVLIN: Q. Rob, did that come out of your general recollection or have you got some other record of this conversation?
A. No, that was just my general recollection at the time.

Q. Just to clarify, would it necessarily be one that an assistant would necessarily pick up on to record in the flood log?
A. They are supposed to record all communications but, like I say, I don't know, because it was handover, whether the technical assistants were busy doing other things at that time. So, the technical assistants would also be

handing over, as such, so they may have been distracted in that sort of activity.

Q. Forgive me, I'm not a student of the log, but were handovers habitually recorded in detail or was it a bit hit and miss on actual content of handover?
A. The content of handover between the duty engineers was based around the situation reports, so we would go through the situation reports consistently. I am not sure what the technical assistants necessarily did. They would sit in on the conversation but, in terms of their activities, they were focused on the review of data, so they would be explaining to each other what part of the network they had just reviewed, and that sort of thing.

Q. So it would be up to the assistant was recorded ultimately in the log --
A. Yes.

Q. -- on handover, which could have a lot of detail in it?
A. Yes.

MS HENDY: Q. Had you ever previously been involved in a flood event where it was necessary to have two engineers on shift?
A. Yes. In fact, as recently as the October and December floods, we'd done that.

Q. Had you?
A. Yes.

Q. Just finally, is there some reason why you and John Ruffini were rostered on together and Mr Tibaldi and Mr Malone were rostered together, when you and Mr Ruffini were the two designated senior flood engineers?
A. No, the only - I mean, the unfortunate part about that was that John Tibaldi had done the Saturday night shift and Terry Malone had done the Sunday day shift, so I was notionally scheduled to come in on the Monday, so I was just the next person in the roster, which is why they called me in.

Q. I just want to take you to paragraph 154 of your addendum statement - I guess really starting at paragraph 153. Can you tell me anything more about those conversations?

A. Well, I had just arrived in the Flood Operations Centre and was appraising myself of the situation. I examined the situation report that John and Terry had prepared at 11 minutes past 12. I recognised that we were now implementing strategy W4 and we were referencing the initiation of the first fuse plug.

We had a discussion as to the advantages and potential disadvantages of, indeed, not necessarily opening all of the spillway gates fully, as is the intention in strategy W4, prior to the fuse plug initiating. As I said, we discussed the potential advantages of doing that and that we could, effectively, end up with lower releases downstream of the dam. But the major disadvantage is that we would lose the fuse plug structure and that would obviously impact future operations. So, after that discussion, we agreed that the right course of action was to, indeed, just operate the gates as indicated in the strategy W4.

Q. Because, effectively, you'd lose your flood storage capacity, wouldn't you, if you --
A. You do, yes. Well, you create the situation where you have a fixed crest structure for a while and your ability to mitigate floods is somewhat limited, especially low-level floods, as a consequence of that.

MS HENDY: I don't have any further questions today. Thanks very much.

AT 12PM THE INTERVIEW CONCLUDED

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