

Reservoir Industry Review
Presentation to the British Dam Society by Prof David Balmforth, 4th October 2021
Post-Event Responses to Q&A

Question from.....			
First Name	Surname	Company	<u>Development of Panel Engineers</u>
Jonathan	Hinks	HR Wallingford	How can we get more engineers onto the panels ? I think this is really a question for the profession to answer. When I chaired the Reservoirs Committee I got a number of employers of reservoir engineers together to discuss this. It might be useful to set this up again. There has to be sufficient incentive for engineers to become reservoir engineers and this is not necessarily related to pay, but how reservoir engineers are valued, how much they are exposed to personal financial risk, job security and career progression. Also for the consultancies that employ reservoir engineers, the liabilities associated with undertaking the work have to be justified against the potential fee income.
		Response	
Samuel	Murray		Should the ICE take a greater role and offer placements or training programmes for prospective SE/IE on a basis of employment/secondment to ensure a continuous supply of new SE/IE and allow those in smaller consultancies the opportunities and knowledge required. The ICE and BDS could play a greater role in training but an income stream would have to be established to cover this. As a general point it is often a good idea for those who create risk in society to pay for its management, so one way would be for the cost of this to be reflected in the fees that reservoir engineers charge. Alternatively, with the EA taking on a greater regulatory role there is an opportunity for them to take more of a lead.
		Response	
Miguel	Piedra	SSE	Becoming an Inspecting Engineer takes a lifetime of experience, including exposure to construction of dams. Do you think that the UK reservoir market can offer the necessary variety of experience to the future Inspecting Engineers in the numbers that are needed? Perhaps better for those experienced engineers to answer this question but I did not detect a lack of variety from which experience could be gained during my work. However, to be fair, mine was only a small sample. Perhaps some of the larger consultants who employ reservoir engineers and who have offices overseas might be able to help more?
		Response	
Alan	Warren	Mott MacDonald	For the panel engineer re-application process, the Reservoirs Committee are limited in the insight they have on the performance of the engineer. Do you have any thoughts on how the Reservoirs Committee should ensure that re-applicants maintain the highest ethical and professional standards as well as technical competency? As I mentioned in my Review, I was surprised at the variety of Inspecting Engineers' reports, so a good starting point would be to have a more thorough review of these during the reapplication process. It would be worth considering different categories of inspecting engineers so that as an inspecting engineer gains more experience they become qualified to inspect higher risk reservoirs.
		Response	
Philip	Wilson		Commercial pilots are continually re-assessed for public safety, we should be no different ? Doctors also undergo regular review and reassessment over their careers. However it does have to be seen to be a fair and robust system and this requires constant vigilance to ensure that is maintained. A probationary period for newly qualified reservoir engineers is also worth considering.
		Response	

Inspections and Reporting

Matt	O'Brien	NRW	Why specifically did David recommend the need for an interim inspection report? Were there examples where MIOS work following on from investigations is not being completed (and SE not calling for a new S10)? In one case it was not clear what MIOS had been required following a further investigation. A certificate was issued in due course but no mention of what the works consisted of and no powers for the EA to require that to be declared. At another reservoir, a specific recommendation to investigate spillway capacity and take necessary measures as a result of a Section 10 inspection was followed later by an S10 (considerably less than 10 years afterwards) that found spillway capacity to be inadequate. But as there was no indication of the works that resulted from the first inspection it was not possible to understand why this was the case.
		Response	
Michael	Hughes	Atkins	I really like the idea of interim reports to allow time for investigations but it needs a change in how inspections are procured and understanding on how it impacts deadlines for issuing reports. Do you have any thoughts on these aspects? Throughout my work I have attempted to give a general steer to how the reservoir safety sector should progress. The detail of how this is delivered is really a matter for those professionally qualified and experienced in this field. I have made separate comments about procurement of the services of reservoir engineers. An interim report would allow early deadlines to be set on MIOS that can be defined then, and where further work is required to investigate a particular aspect of safety (also to be completed in a defined time), then the final report can specify further MIOS on completion of the investigation with clear deadlines for delivery set at that stage.
		Response	
Malcolm	Eddleston		In some of the countries you looked the higher risk reservoirs, your suggested Class 1, have risk assessments undertaken by Review Panels rather than relying on a single Engineer. In the UK this happens on new build reservoirs. Could you give recommendations on when a Review Panel would be advantageous and cost effective in terms of risk. I did consider this but felt that recommending Panels across the range of Class 1 reservoirs would be unduly onerous. What is important is that an inspecting engineer should not undertake any work or assessment for which s/he is not competent. This is a professional requirement for ICE members. In such cases additional expertise must be brought in and the methods of procuring inspecting engineers should be such as to accommodate this where required. This would effectively allow the use of panels where necessary and on a case by case basis.
		Response	
Barry	Dooley	Stantec	Did you give any consideration to the adoption of inspection panels for Class 1 reservoirs rather than a single individual ARPES, as is the case under the current system? Yes I did. I think in some cases there is a sound argument for this but see my reply above
		Response	
Andy	Hughes	Dams and Reservoirs	What extra liabilities do you believe the SE is taking on with the suggestions made [of increased responsibilities and tasks]? The owner is liable for the safety of their reservoir. My recommendations do not fundamentally change the role of an SE and my recommendations largely reflect what already happens at many reservoirs that have adopted a sound approach to managing safety.
		Response	

Commercial

Philip	Wilson		Does fee competition help or hinder dam safety ? In principle there is nothing wrong with fee competition if it is used in the right way. What is important is that reservoir engineers have sufficient time to do their work thoroughly and report appropriately. Their fees should also reflect the time needed to keep up to date and to undertake periodic review for reappointment. Reservoir engineer fees form only a tiny part of the whole life costs of reservoirs and given the liability associated with ownership, sound engineering advice should be worth paying for.
		Response	
Mahmoud	Shahin	Jerseywater	How to achieve balance between owners being required to decrease operation costs and maintaining enough resources to [appoint] Supervising engineers ? See my answer to the question above. I'm not sure I follow the requirement for decreasing operational costs. Very many of our reservoirs are old structures and as my report demonstrates, require adequate maintenance, surveillance and operation. This requires investment.
		Response	
Richard	Williams	Welsh Water	Many UK high risk reservoirs have significant secondary purposes in water supply and environmental management, both of which can push costs to complete work very high. Were any conversations had with water industry regulators to try and improve financial streams and remove red tape to achieving essential safety work? My discussions were entirely with reservoir owners in this respect. I did not consult OFWAT for example. This was not part of my brief and I consider that it is essentially a matter for water companies to manage their relationship with regulators. However, I do not think that financing systems should prevent essential safety work. The law is clear on this and I have referred to that in my report. ICOLD also has some useful policy statements in this respect.
		Response	
Andy	Hughes	Dams and Reservoirs	David mentioned something about better remuneration and procurement for Panel Engineers considering the consequence of failure. What would he suggest is a fair level of remuneration for a Section 10 inspection when the consequences of failure can be the loss of several thousand lives , a price tag of perhaps one billion pounds and the loss of operating licence of a water company and a hard time in the witness box for the Panel Engineer? I am afraid this question goes beyond the brief I was given for the Review.
		Response	

Small Owners

Stephen	Lockett	AECOM	I see a major issue with reservoirs in private ownership, often with insufficient funding, knowledge or inclination to maintain them in a 'safe' condition. What would have happened if Toddbrook was under this type of ownership?! I suspect it would have failed. I would welcome some discussion on how we change this situation. I did consider the potential to license owners but decided against this as some owners might use this as a way to absolve themselves of their responsibilities, possibly leading to the creation of many more orphan reservoirs. However, if there is clearly no financial benefit to an owner from a reservoir then there is the option for the owner, or the regulator at the owners expense, to decommission the reservoir. It is something that will have to be kept carefully under review.
		Response	

Andy	Hughes	Dams and Reservoirs	Mr Balmforth says there is little work for the owners to write a Reservoir Safety Management Plan and most have the elements in place already. That simply isn't true for most owners outside the large companies. Therefore this is yet another cost to owners who will see no benefit. Earlier briefs to engineers working on changes to legislation was to keep the costs 'neutral' for the UK i.e. there are savings that equal the increased costs elsewhere. Did he consider the costs of all this extra paperwork? A careful read of the section on Classification of Reservoirs in my Report will reveal that I have indeed considered the overall impact of costs of regulation. In my consultation with reservoirs engineers and the Reservoirs Committee there has been good support for the formalising of Reservoir Safety Management Plans. RSMPs should foster good practice in reservoir management and thus help to reduce the potential liability that arises from ownership. Most responsible owners will see the benefit in my view.
		Response	
Andy	Hughes	Dams and Reservoirs	ALARP etc. Can he tell us how we can convince an owner of a small reservoir that it is now necessary to do an ALARP assessment which actually is unlikely to change any recommendation and that he will have to pay for it? A considerable part of my Review Report is dedicated to what we mean by safety and to justify the ALARP approach. It is clearly set out in my report. The approach is widely adopted in other infrastructure sectors and in the management of the safety of reservoirs elsewhere in the world. At a meeting of representatives of the smaller reservoir owners I was told that understanding why MIOS had been recommended would be helpful to them and encourage them to be more engaged in the management of their reservoirs. Knowing how measures have been assessed and understanding that there is the principle of reasonableness attached, should therefore be helpful.
		Response	

Regulation

George	Johnson		How would David recommend separation of the EA gamekeeper and poacher rolesmeaning gamekeeper as regulator and operational maintenance as poacher? This is an important point. The reservoir regulatory function within the EA would need to be separated and seen to be separated from the parts of the EA that manage their reservoirs. This could be done in different ways but separating the reporting lines to Director level, ring fencing budgets and staffing, and separating public annual reporting could be some of the tools that might help with this. However, it is up to the EA and Defra to manage this and to review on a regular basis. Other countries successfully place the dual functions within the same organisation.
		Response	

Risk Assessment and Proportionality

Jonathan	Hinks	HR Wallingford	Does Professor Balmforth favour the use of quantitative risk analyses informed by international statistics such as those provided in ICOLD Bulletin 188 and Foster, Fell and Spannagle (2000) ? One reason for proposing different classes of high risk reservoirs is to allow them to be managed in the proportion to the hazard that they create. For Class 1 reservoirs a quantitative risk assessment can be justified. Precisely how this might be done would be best determined by experienced reservoir engineers but there appears to be plenty of material and experience to base this on.
		Response	
Rodney	Bridle	Dam Safety Ltd	I was pleased to see you advocating the application of quantitative risk analysis to keep dams safe. Does RARS not already make this possible for our reservoirs? The reservoir engineers I consulted had different views about RARS. What is most important is that we move to a risk based approach and focus our efforts on the reservoirs which create the highest hazards for society. It seems to me that the risk assessment of reservoirs is an evolving process and it is incumbent on reservoir engineers to keep abreast of the changes and for the good services of the BDS and the ICE to assist with this.
		Response	
Andy	Hughes	Dams and Reservoirs	Both Mr Balmforth and the EA have used the work proportionality associated with the proposed changes . How is that to be defined and how would he suggest to the Regulator he could apply proportionality to Reservoir Safety Management Plans , On site plans and other issues suggested? I have made the case for proportionality in the section of the report that deals with the potential classification of high risk reservoirs. Whilst this focusses more on inspections, the principles can readily be applied to reservoir safety management plans. I am sure that the EA, in consultation with reservoir engineers, can devise an appropriate approach to RSMPs that avoids a tick box approach, is sufficiently detailed for Class 1 reservoirs, but avoids being unnecessarily onerous for Class 3 reservoirs.
		Response	
Andy	Hughes	Dams and Reservoirs	Does he understand that if the input to a risk assessment is lacking then the output from a risk assessment is meaningless? An ARPE doing an inspection on Toddbrook did a 'risk assessment' on the spillway and said it was safe!- comment please? I believe all engineers at some point in their learning are taught that if the input to analysis is flawed then so will be the output. My comments on the Toddbrook incident can of course be read in detail in my earlier report - I don't have anything to add to them here.
		Response	

Other

Stephen	Shakespeare	Welsh Water	You mention us as engineers serving the public, those at risk of coastal and fluvial flooding are usually well educated and understand the risk that they face. Do you feel that the majority of those at risk from a dam failure are unaware of the risk? How do we reassure and educate the public? A good first step might be that when the public ask for a copy of an inspection report they are not sent one that is almost entirely redacted. Nothing undermines public trust more than secrecy. The more of our work on reservoir safety that can be placed in the public domain the better in my view. My experience of the public is that they are perfectly able to educate themselves - what they need is the means to do so. My recommendation 14 deals specifically with this issue.
		Response	
Lucy	Monkhouse	C&RT	David, you mentioned that not all recommendations had been taken forward from the Pitt Review. Being in a position 13 years later, how do you feel towards achieving success in your recommendations in a timely manner? Being relatively new to the reservoir industry (last 2 years), I feel that it will be a decade before we start to see a 'real' change if working towards your recommendations. I think this will be variable. Some things will happen quite quickly and some things will take a lot longer. I have tried to craft my recommendations to make them as easy as possible for Government, the EA and the industry to implement. However there is no getting away from the fact that some legislative change will be needed and this may take time. Change is always difficult to see in the present tense. We think nothing is happening but when we then look back over a few years we see that change has actually happened. I think we all want to make this work so I am positive about the future.
		Response	