



Meeting report: The 2015 supervising engineers' forum

Newman Booth

Supervising Engineer, Principal Engineer, Reservoirs, Yorkshire Water Services Ltd, Bradford, UK (newman.booth@yorkshirewater.co.uk)

The 2015 supervising engineers' forum was held at the National Motorcycle Museum, Birmingham, on 29 April 2015. The sessions covered the following topics: updates in legislation; a practical session looking at incidents, planned maintenance and health and safety; risk management; and succession planning and industry developments.

The forum started at 9.45 a.m. following registration and morning coffee. The forum was introduced by David Neeve of Arup and formally opened by the chairman of the British Dam Society, Dr Andy Hughes. Andy handed over to the chair, Ian Hope of Severn Trent Water, for the first session on legislation. The first presentation was given by Alan Warren of Mott MacDonald with his paper entitled 'A Guide to the Reservoirs Act for Supervising Engineers'.

Alan's presentation focused on the impact of recent changes to the Reservoirs Act 1975 (1975) and the details of the designation process and the transitional arrangements. He also emphasised the need of the undertakers to report any incident that could have resulted in an uncontrolled release of water, and then continued to provide the necessary guidance to the supervising engineers on their revised responsibilities and encouraged them to participate actively in the completion of flood plans.

Alan's presentation was followed by that of Mark Ackford of the Environment Agency (EA). Mark's presentation started with him explaining the detailed risk designation process the EA has followed, and that this is law which they are duty bound to enact. The approach taken has been to create a risk designation panel responsible for assessing individual reservoirs. EA flood maps were utilised in the designation process – these gave the base data to determine whether more detailed analysis was required. There have been a series of checks and balances throughout the process, including representation, review and appeal, with a period of 3 months for representation. The onus is placed on the undertaker to provide proof should they choose to contest the provisional designation; and they will be able to access the information utilised by the EA in making the designation.

Mark concluded by summarising the current progress and provided an update on the number of provisional designations: out of some 1700 reservoirs examined to date, 1450 had been deemed to be as provisionally high risk.

The third presentation was given by Matthew O'Brien of National Resources Wales (NRW) and concentrated on the reservoirs legislation in Wales, which is being implemented due to concerns over public safety, and seeks to reduce the volume threshold to 10 000 m³.

The key focus of the paper was to give details regarding the differences in this, the Welsh legislation and the earlier English updates. Matthew confirmed that initial assessments indicated that there were potentially 250 reservoirs which fell between the 10 000 and 25 000 m³ thresholds. NRW is also currently developing flood maps, and is provisionally designating reservoirs ahead of the legislative changes. He then went on to detail that sections 12(1), 12(2A), 10(3)(b) and 12(6) of the new Reservoirs Act 1975 (1975) will be enacted, as will statutory incident reporting.

The final presentation of session one was given by Huw Thomas of the Scottish Environmental Protection Agency (SEPA). His presentation further expanded on those of Mark and Matthew, and gave insight into the reservoirs legislation in Scotland and concentrated on the Reservoirs (Scotland) Act 2011 (2011) and Reservoirs (Scotland) Regulations 2015.

He explained how SEPA is using its own dam breach maps in the risk designation process, and that there is a six yearly periodic review of these designations. SEPA will also be seeking to recover costs for legislation, and that civil sanctions will become available from autumn 2015.

The first session closed with an informative open forum question and answers session chaired by Ian Hope. The key questions centred on the difference between the devolved governments and subtle variations in legislation and its application. The chair asked whether Wales and Scotland intend to publish guides to their respective acts, as was the case in England. Matthew O'Brien confirmed that Wales intended to produce a guide in a format similar to the current guide to the Reservoirs Act 1975 (1975). Huw Thomas was unable to

confirm, although there was the potential for similar guidance (Figure 1).

The second session of the forum began following a brief coffee break and networking opportunity. This session was chaired by Tracey Williamson of Dwr Cymru/Welsh Water (DCWW) and concentrated on practical issues affecting supervising engineers and owners/undertakers.

The first presentation was given by David Brown of the Canals and River Trust (C&RT) detailing a recent operational incident at Boddington reservoir in south Warwickshire. The reservoir is used as a feeder supply to the Oxford canal; it is constructed in 'saddle' and the reservoir is impounded by way of embankments to the south (main dam) and north (smaller category C, added in 2006). The incident involved the discovery of a sink hole in the embankment of the feeder canal, which led to the emergency plan for the reservoir being invoked. A drawdown of the reservoir was affected following consultation with an all reservoirs panel engineer (ARPE). The issue was resolved quickly, the term contractor was mobilised within 5 h and they worked until midnight adding clay blanketing to the sink hole. The clay was dressed the following day and a 'Post Incident Report' form was issued to the EA. The presentation demonstrated the benefits of having emergency plans when dealing with reservoir incidents.

The next presentation was given by Nick Folkes of United Utilities (UU) and concentrated on the health and safety of those who access reservoir valve shafts and tunnels. Nick gave an overview of the number of assets and their average, these being 180 statutory reservoirs and 120 years, respectively. He went on to explain the benefits of examining these assets,

and how it could potentially conflict with UU's safety policy of 'Nothing we do is worth getting hurt for'.

The presentation focused on the potential problems faced in accessing these assets, namely – their confined nature, issues with free flow of air, harmful gases, vandalism and unauthorised/unwanted access and casualty recovery. A number of these items can be addressed by risk assessments and control; however, some require further measures.

Nick detailed how UU had begun a programme of asset improvement and replacement and were exploring the use of innovative technologies such as laser scanning. This was combined with improvements to access landings and ladders, alternative fall arrest systems and a standard approach to personal protective equipment. He concluded in stating that these potential changes, driven by health and safety had a potential cost of £7 million.

The third presentation shifted the focus back to emergency planning and was delivered by Stephen Shakespeare of DCWW. Stephen opened with a statement regarding the conflicting jargon used by reservoir engineers and emergency planners; this was apparent at an event run in south Wales. He also identified that engineers are often asked the question 'How long until it fails?', which is often difficult to answer. The emergency planning event highlighted other issues, a key one being how to dovetail on-site and off-site plans, where does one start and the other end? Other concerns were: Are we trained to deal with events and whose emergency is this? The emergency is often managed by the police.

The main learning from emergency planning is to involve operational and key staff, do not let the plan sit on a shelf, understand triggers, embrace technology, understand access arrangements, the importance of documents and information. And, critically debrief, learn from the event and remember 'engineers are only human'.

The final presentation in the morning session was given by Jonathan Howard of DCWW and looked at the operational and health and safety aspects of replacing ladders and landings within the valve tower at Ystradfellte reservoir. Ystradfellte is impounded by an earthfill dam, 29 m high with a puddled clay core and serves as the sole supply to the nearby water treatment works. The presentation explored the complex problems associated with replacement of metalwork in an ageing asset; there were problems relating to the isolation of valves and the ongoing requirement to supply water for treatment. The Construction and Design Management (CDM) regulations called for double isolation of the work area, which in turn resulted in a requirement for divers to install a plate over the supply pipework inlet. The scheme was ultimately



Figure 1. Session one open forum discussion

completed successfully with seven landings constructed from a mixture of heavy galvanised steel and stainless steel.

The session concluded with a brief open forum discussion where Dr Andy Hughes took the opportunity to highlight the problems faced by all undertakers/owners in accessing valve towers and tunnels. He felt that a standardised approach was required and that the British Dam Society would be willing to assist. Lunch followed an announcement by Richard Cox about the drive for more British Dam Society involvement within schools.

The hot buffet lunch provided a chance for the delegates to refuel and further network prior to the first afternoon session on risk management chaired by Henry Hewlett (ARPE). Tony Judge of Atkins Ltd presented the first paper which looked at redundant Scottish Water reservoirs, and the various options for disposal or discontinuance. Scottish Water had 96 non-operational reservoirs, 41% of which were consequence category A and Atkins was employed to explore options for disposal. The following options were considered for each of the reservoirs: make safe and maintain, discontinuance, sale (following completion of safety items), rental and hydro-generation. The reservoirs were split geographically and feasibility reports were created detailing the most feasible options for each.

Tony summarised that discontinuance is not a simple process and illustrated this point with three separate case studies looking at discontinuance.

Louise Shaw of Rheinisch-Westfälisches Elektrizitätswerk AG group gave the next presentation detailing how a gate replacement scheme was undertaken at Coedty reservoir. The now infamous Coedty dam was constructed in 1924, failed in 1925 and was subsequently rebuilt in 1926 – the gated spillway was added in 1955 and comprised three hydrostatically operated tilting gates; the middle of which is designed to operate first.

The refurbishment of the gates included replacing the side pins and refurbishing the pivots in situ, while the original operating mechanism was retained after successful testing. The scheme was successful and Louise confirmed in the questions session that the cost had been c. £30 000–40 000.

The third presentation was delivered by Andy Courtnadge of Jacobs Ltd and was entitled 'Drawdown Capacity'. Andy explained how Defra and the EA have requested this research and the project is being managed by the EA, delivered by Jacobs with Alan Brown and John Gosden providing ARPE the input. He then went on to detail the purpose of drawdown facilities, and how early intervention potentially averts failure,

buys time and reduces the load on a dam. There is no industry standard for drawdown and differing standards are to be adopted by both panel engineers and owners. The new document seeks to cover all dam types and is being driven by internal erosion as this accounts for 43% of dam failures. The aim is to finalise the report as draft, review the results of an ongoing trial and to publish the document by the end of the year (2015).

The final paper in session three was a joint presentation by Alan Brown and Anthea Peters of Stillwater Associates and Arup. The presentation concentrated on how the risk assessment for reservoir safety (RARS) methodology and its benefits can be applied for supervising engineers. Alan opened with a short explanation of risk being a product of probability and consequence before handing over to Anthea. Anthea detailed some of the methodology and typical values, and detailed how the supervising engineer should be involved in the process. The concept of the methodology is to consider threats, how they will initiate and how they can progress to failure. The aim of the methodology is to concentrate the mind of the supervising engineer: What are the potential breach mechanisms? Are they credible? Are they significant? She then went on to provide an example of how RARS could be used to identify the potential for erosion alongside the spillway walls at a sample dam before concluding by looking at probability (f) versus average societal loss of life (N) on an example fN chart.

Session three was again followed by a brief open forum discussion chaired by Henry Hewlett. The main area of questioning was directed towards the drawdown presentation, with concerns voiced over disproportionality of application.

The final session of the day was chaired by Dr Andy Hughes and looked at succession planning and industry developments. Andy started his presentation by stating that succession planning in reservoir engineering is not limited to the UK and is an international problem.

John Chesterton of Mott MacDonald gave a brief update on the current status of the Environment Agencies reservoir safety research strategy. The strategy is to identify the research required through the following processes – review, consult, update, strengthen.

The final presentation of the day was delivered by Samuel Tudor of DCWW, and it focused on the young engineers' forum. Sam detailed the challenges facing the industry with the potential increase in assets, ageing assets, increasing levels of monitoring and maintenance requirements and population growth leading to demands on water supply. The aim of the young engineers' forum is to promote succession planning within the British Dam Society and to increase the number of

members under the age of 35 years. Samuel has been appointed as the Chairman and Richard Grievson and Jonathan Morris as Vice Chairman and Secretary, respectively. A number of initiatives are being explored, such as social evenings and events, a mentoring scheme, school involvement and attendance at British Dam Society events.

This short session concluded with question and answers, with an initial question from Martin Airey of Mott Macdonald who asked whether succession planning was being considered for inspecting engineers. Sam Tudor responded that the initial focus of the young engineers was on supervising engineers.

The session was closed and Andy Hughes handed over to Andrew Pepper of Atpec River Engineering Consultancy, who invited the panel for the final open discussion session to the stage. Andrew was joined by Tony Deakin of the EA, Dr Andy Hughes representing the ARPE, Steve Morris of NRW representing the supervising engineers and David Brown of the C&RT as the owner's representative (Figure 2).

Andrew Pepper used the chairman's privilege to ask whether one should use the 12(6) statement even if work has been carried out. Tony Deakin responded that this is a matter of pragmatism, while Steve Morris stated that it should be used if no progress is being made. The focus of the questions moved towards succession planning and the amount of experience required to become a supervising engineer. Neil Williams of Stillwater Associates asked whether, in light of the issues regarding succession planning, the supervising engineer guidance criteria should be reviewed. David Brown felt the guidance duration of experience may be excessive; whilst Andy Hughes stated that it was all about the breadth of experience



Figure 2. The captivated audience

not necessarily the duration. Further areas of questioning were related to succession planning for ARPE, internal erosion in dams and flood plans and emergency planning.

Overall, the forum was well-organised and well-appreciated, which was brought to a formal close by David Neeve of Arup.

REFERENCES

Reservoirs Act 1975 (1975) *Elizabeth II, Chapter 23*.

Her Majesty's Stationery Office, London, UK.

The Reservoirs (Scotland) Regulations 2015 (2015), *Elizabeth II, Asp 9*. Her Majesty's Stationery Office, Edinburgh, UK.

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