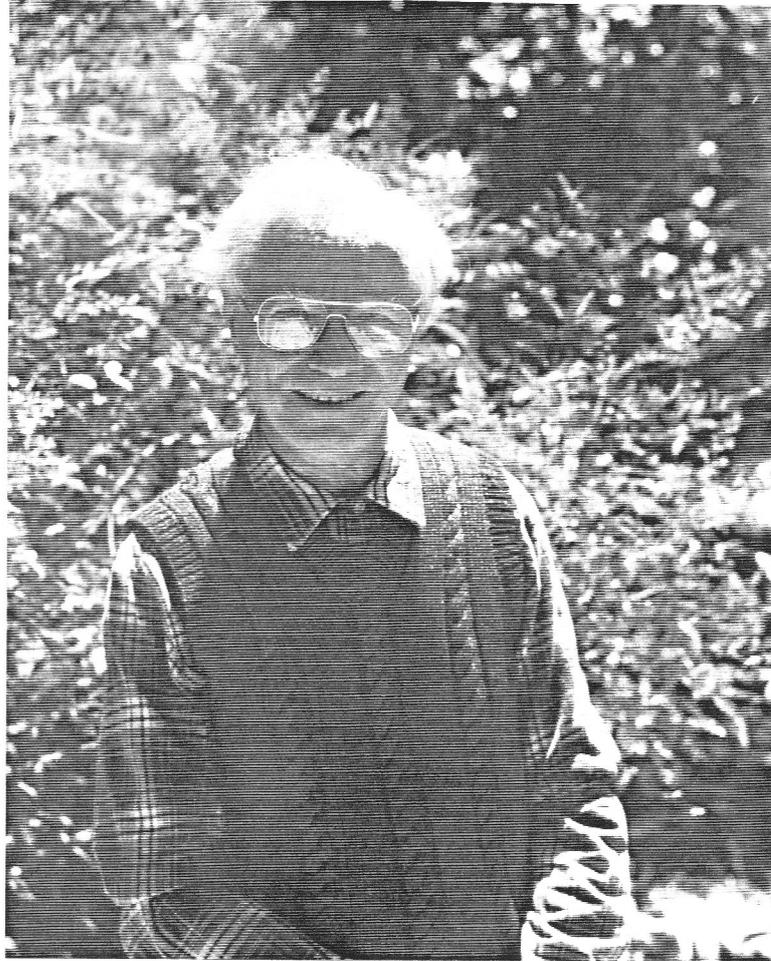


BERNIE FITZGERALD

Bernie was born in 1921 in Brisbane. He studied engineering at the University of Queensland after having served in a field company (i.e. engineer unit) in the army during the Second World War. He commenced employment with the Department of Works in Brisbane in 1950. He married Shiela in 1953 and they had seven children. After coming to Canberra, Bernie designed the Bendora Gravity Main. Subsequently he worked on many other projects. He retired from the department in 1982.



Tape 1 Side A

Bernie arrived in Canberra in April 1964. He worked in the department's Investigation Section for a time doing investigation work connected with Corin Dam. He then went onto the design of the Bendora Gravity Main as Arn Fokkema [also interviewed] was too busy with Corin's design to take on the main. Bernie had done pipeline designs in Papua New Guinea and Queensland.

Bernie's Corin involvement is discussed first. He accompanied drilling teams to the dam site in 1964. Due to the difficult access along the route via Orroral Valley to the Cotter, some trips went in via the Mt Franklin Road; some drill rigs were too big for the Orroral track anyway. Sometimes he got bogged on the Orroral route. Bernie says there was no camp on the site at the time [see elsewhere in this report for details of the camp; Bernie maintains the camp was subsequent to his visits]. Bill Sauverain was a Works supervisor at the site at the time; there were bulldozers operating to remove overburden.

Talking now about the gravity main, Bernie says that among the central considerations in the design process are the capacity required of the main in terms of water resources

and the use made of the water. Studies were made also of Googong at the time so as to be able to conclude that gravity water from Bendora would be the cheapest for Canberra. With such cheap water, the use made of it would increase.

The water resources of the Cotter catchment had to be studied. This was based on flow records from gauging stations. These stations were 'very important. Without them you'd be guessing. It's as simple as that'. The earliest stations were simple gauge boards which officers visited frequently (daily) in order to record the river level. Then clockwork gauges came in and these gave continuous readings on paper over a 7 day period. Battery-operated gauges came in later. Continuous readings gave more accurate information than the early 'one off' daily readings. Stream gauges, utilising a well with a float in it which is connected to a graph, measure stream level. The other form of measurement using a mechanism with a propeller (done either by staff standing in the river or sitting in the seat in an overhead flying fox) measures velocity. From these measurements of level and velocity the stream's volume can be calculated.

A team of three designed the gravity main. There was Bernie, another engineer and a draughtsman [after the interview Bernie recalled their names were John North and Terry Brady respectively]. The fieldwork took 5 to 6 months and the design took a similar period.

'Specials' (pipes with bends, fittings etc) were designed for parts of the main, but the normal pipes were able to be curved slightly anyway on the more easy bends of the line. Anti-vacuum valves were used on high points of the pipe because the thickness of the pipe was very thin relative to the pipe's diameter and a vacuum could collapse the pipe. Air valves were installed on high points to let trapped air out of the pipe and so counter water hammer.

Bernie and John determined the route by walking it for weeks on end, about an hour a day [Bernie later clarified that this meant an hour's *new* section per day; the round trip could take 5-6 hours]. They located the almost vertical areas which had to be avoided, and arrived at the best route. 'We used to average about a mile an hour, because you were walking through virgin scrub — there were no tracks or anything. And as you got closer to the river the scrub got denser...It's pretty country, very interesting to walk through...Most of it was done in the wintertime, which is not the time you'd choose if you had a choice but that was the time when that part of the operation had to be done...There was snow on the ground sometimes and actually we had to cross the river a number of times, and the water was freezing. We saw pools of ice.' The country was not as rugged as that in Papua New Guinea. Some snakes were seen.

A relatively straight route was chosen over a route around the contours in order to save money. The contour route would have cost another million dollars.

Tape 1 Side B

The pipes were coated with bitumen, internally to protect the pipes from rust by Bendora's soft water, and externally as rust protection once the pipes were buried.

During construction Bernie went out to the job fortnightly, sometimes at the request of the engineers on the job or otherwise just to see how it was going. 'I think the contractor did a very good job under very difficult conditions. It's one of the most difficult locations I've been in for a contract like that to be carried out. So I think he did a very good job actually. I think also the job turned out far more difficult than the contractor originally thought.'

The country was steep, but more stable than what Bernie had known in New Guinea where part of a race for a hydro scheme was wiped out by a landslide.

A welder did the first weld on the pipes, then other welders did the subsequent welds (the welds were in layers). The first weld was very important. As the main got closer to the Cotter, with the greater pressure the pipes and welds had to be thicker. Bernie recalls seeing a bulldozer acting as an anchor for another dozer as the terrain was too steep for one machine to operate on its own.

Bernie recalls the valve test incident that occurred during the testing of the main [see also Waldron and Moore interviews and Sherratt correspondence]. Valves were being tested at the Murrumbidgee and the changing velocity of the water caused a water hammer wave to go up and down the pipe. At the open end at Bendora the wave changed sign from positive to negative. The anti-vacuum valve on the top of the steepest slope on the main opened but when the positive wave came back the valve failed to close. The valve was 10 inch diameter and water flowed out and down the slope, eroding the fill. The pipe was not damaged [see Waldron interview on this point] but [extra] cut-off walls had to be provided and new fill installed. Subsequently a concrete housing was made around the valve area and a diversionary channel was built to divert water in the event that the same thing recurred (as did happen).

Bernie explains the detailed process of filling the main. Care has to be taken not to create water hammer. The main is filled slowly from one end and then the other. The main is emptied in winter to allow scouring of the slime that grows in the main. The gravity main is much bigger than the pipe which was originally conceived, due to Canberra's much bigger population. Bernie can't recall any opening ceremony; as the main is mostly underground there wasn't much attention focussed on it.

The relationship between NCDC and Works was a 'very close working relationship'. You knew the Commission people on a personal basis, 'almost as if you were from the same department'. Rod Dalgleish and Clive Price are named. There were more discussions during the investigation phase than the construction phase.

Asked to reflect on his experiences, Bernie replies 'I think I was very fortunate...Quite a major project, very interesting too...I think without any doubt it was the most interesting design project that I've been involved in. And the most challenging.'

The interview concludes with brief reference to flood studies in regard to the design of Corin Dam.