STORING CULTURAL COLLECTIONS WITH MINIMAL IMPACT ON THE ENVIRONMENT

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This paper discusses the work being done at the National Archives of Australia (NAA) on its storage standards.

There are a few drivers for this:

- One of the biggest costs for the NAA is storage – we have buildings around the country and in places like Darwin and Perth the external conditions are pretty extreme. Thus our plants work very hard to maintain set conditions. If we could change the standard to allow for greater fluctuations we could save significant money.
- There is a strong push in the Commonwealth Government to reduce the carbon footprint of our buildings. From the conservation point of view if this is the way of the future we need to be involved in the dialogue and not be seen to be bloody minded or needlessly prescriptive. At the same time we need to ensure the safety of our collections.
- The NAA is planning for a new building in Canberra – the specs for the building will take the standard into consideration – we need to ensure it is correct and not too extreme.

A quick bit of background:

- The vast majority of our collection is paper based. We have 380 shelf kilometres of records, which translates to 1.9 billion (US) sheets of paper.
- We also have significant holdings of audiovisual material, motion picture film and photographic prints and negatives.
- Almost all of our collection is boxed.

To explore the question of standards we have done some research, which has involved:

- a reading of all work being done internationally on the subject;
- in-house experimentation;
- examination of various sets of conditions using the Isoperm model as a tool.

The Isoperm model was developed by an American physical chemist called Donald Sebera. He simply took two rate-based chemical equations, one for the temperature-related deterioration of paper and one for moisture-based deterioration of paper, and combined them. The combined formula can then be used to compare the projected deterioration at different environmental conditions. To better visualise what the formula is telling us I have converted the Isoperm value to a lifespan.

Temperature	Humidity	Isoperm	Life span
23°C	50%	1	500
20°C	40%	2.05	1028
4°C	40%	24.5	12,276

Table 1 | Isoperm values expressed as lifespan

I'll give you one example – say we have a paper which we know would lose all its strength in 500 years at 'standard' conditions of 23°C and 50% RH. We will give this an Isoperm value of "1". If we drop these conditions to 20°C and 40% RH we would double the Isoperm and increase the life of the paper to 1028 years. The colder and dryer we go, the longer the paper will last. So if we go to 4°C and 40% RH the life of the paper would be 12,276 years.

Just for interests sake I did an isoperm calculation based on average external temperatures and

humidities in all of Australia's capital cities. Results are inte resting:

City	Isoperm	Life span (years)
Canberra city	2.507	1253.5
Hobart city	2.433	1216.5
Melbourne city	1.680	840
Adelaide (Kent Town)	1.319	659.0
Sydney (Bankstown a/p)	1.155	577.5
Perth city	0.995	497.5
Brisbane city	0.639	319.5
Darwin airport	0.243	121.5
Thredbo	5.401	2700.5

Table 2 | Isoperm values for Australian capital cities

This is really just a way of confirming what we already know. Ambient conditions in Darwin are more extreme and damaging than those in Hobart. It does beg the question of where we should be storing our cultural materials. If everything was in Canberra, or better still Thredbo, we would spend less on air conditioning and reduce our carbon footprint.

Going back to deliberations at the NAA, our researches into the effects of boxes tell us that boxes significantly reduce the effects of environmental fluctuations on the boxed material. This is further assisted when the material itself is bulky, hygroscopic and tightly packed. The implication of this is that we can be somewhat more relaxed with our allowable variation over time – rapid changes simply do not transfer inside boxes. Combine this with the growing movement internationally that we may have been too strict with our environmental standards – in the areas of allowable fluctuation and rate of fluctuation.

The NAA has therefore revisited its internal storage standard. Here are the conditions we now allow for 'standard' paper storage:

Temperature: 17°C - 23°C (tolerable daily change of 3°C)

Humidity: 30% - 50% RH (tolerable daily change of 10%)

It may not look significant but we have greatly extended our allowable range at the bottom end – we can go drier and cooler than before. This allows us to make greater use of ambient conditions, particularly in winter time. I should note that there is definitely a bottom limit for humidity below which paper becomes brittle, but there is not a lower limit for temperature. The problem here is people – we have staff doing retrievals and they cannot operate below 17°C.

This standard has been in place for some time and we are working towards following it in all our repositories. Monitoring of energy use has already revealed some savings. At the same time, we have also been looking at areas where we can simply turn plant off. The obvious example is our security vaults in Canberra. These are fully within the building and have thick concrete walls. We have found that with plant off we achieve flat line conditions well within the standard.

Of course the NAA does not just hold paper; our standard sets conditions for all materials – film, photographic and audiovisual. Each of these materials has their own needs, more stringent than paper, and these are reflected in the standard.

AUTHOR BIOGRAPHY

Ian Batterham was among the first intake of students for the original materials conservation course at the CCAE. He graduated in 1980 and took up a position at the National Archives of Australia, where he remains to this day. Over the years Ian has carried out a range of significant treatment projects including work on the Walter Burley Griffin Canberra designs. He is author of the book *The Office Copying Revolution* published by the NAA. He has completed a Masters Degree in Materials Conservation at the University of Canberra and has often filled in as lecturer in Paper Conservation there. He is currently Assistant Director, Preservation at the NAA where he carries out a range of research work, currently he is examining in reduction of energy costs for archival storage through making changes to storage standards.