NOTES AND REFERENCES

1. *Library and Archives Conservation.* The Boston Athenaeum's 1971 Seminar on the Application of Chemical and Physical Methods for the Conservation of Library and Archival Materials, 17-21 May 1971, edited by George Martin Cunha and Norman Paul Tucker, Boston 1972, p.137.
2. See 'Recovery of flood damaged documents by the Queensland State Archives' by Lee McGregor and Jim Bruce, *Archives and Manuscripts*, Vol. 5 No. 8, August 1974, and 'Damage to records in Darwin caused by Cyclone Tracy' by N. J. Corbett in *Archives and Manuscripts*, Vol. 6 No. 3, May 1975.
3. For a description of the Q.S.A.'s fumigation facility see 'The Queensland State Archives Fumigation Unit; Ethylene Oxide/Vacuum Fumigation as an aid for the preservation of Archives and Manuscripts' by A. J. Woodhouse in *Archives and Manuscripts*, Vol. 4 No. 3, November 1970.
4. Fumigation of records is dealt with in the major text books on conservation, for example see *The Conservation of Antiquities and Works of Art* by H. J. Plenderleith and A. E. A. Werner, O.U.P. London 1971; *Conservation of Library Materials* by George Martin Cunha and Dorothy Grant Cunha, Second Edition, The Scarecrow Press, Metuchen NJ., 1971; *Conservation and Restoration of Archive Material* by Yash Ral Kathpalia, UNESCO, Paris 1973.

DEACIDIFICATION, LAMINATION AND THE USE OF POLYESTER FILM

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At most European and American institutions, the lamination of manuscripts of archival value (papers which should be preserved indefinitely) has been almost completely abandoned in favour of techniques which are far less damaging to the originals and which leave them completely accessible for any future treatment if it is ever required.

There is ample evidence that lamination without deacidification and alkaline buffering is basically worthless as a preservation technique; and, if it is not already, it must very soon be accepted that all materials to be laminated must be deacidified and buffered with an alkaline salt which in turn must leave approximately 3% buffer-reserve in the paper. But most aqueous deacidification and buffering treatments used at present cannot be relied upon to leave this amount of alkaline reserve in all papers; for papers, differing widely in kind and condition, are receptive in different degrees to the treatment. As an example, the rather commonly-used Barrow's one-solution method, using 2 grams per litre magnesium carbonate, does not leave the adequate 3% reserve in the deacidified papers.

Documents for archival preservation, which are expected to last for hundreds of years after preservation treatment, should *never* be laminated, as there is sufficient evidence now available to eliminate it as an acceptable technique. The alternatives are techniques like polyester film encapsulation which cannot damage the documents in any way whatsoever.

Polyester film is by far the strongest physical support medium available and moreover it is instantly reversible, while all lamination processes need treatment with water and solvents before the tissue and

film can be removed, at most times with considerable difficulty. With polyester film encasement, the option for additional treatment is always left open.

Information from a variety of international institutions seems to support the assertion that many documents suffer considerable deterioration as a result of the heat and pressure of the lamination press, even though they may be subject to the heat and pressure for a relatively short period. In a great many cases it is an observable fact that papers darken or yellow significantly as a result of this heat and pressure, and there is a wealth of evidence to show that many paper materials which were laminated 15 to 20 years ago are now turning brittle within the lamination tissue.

It is virtually impossible to discover the actual causes of this embrittlement, as the analytical tests necessary are destructive and so cannot be performed on these archival papers. The evidence of the effects, however, should certainly be sufficient reason to adopt a much more cautious approach to all presently-known lamination processes. Much experimental data has shown that one reason for the rapid deterioration of such laminated documents is the rather unpredictable aqueous deacidification and buffering treatment used. Another reason could very well be that the cellulose acetate and other laminates used never conformed to proper archival preservation specifications.

Adequate guidelines for the testing and control of deacidification solution are already available, but some specific recommendations, notably Barrow's, are not being carried out consistently by restoration workshops, and sometimes not at all. This is chiefly because the individual restorer or operator of the deacidification process does not have the basic understanding of pH, deacidification and buffers. For example, titration of deacidification solutions is a fundamental method of checking such solutions before and during treatment — it is, in fact, almost the only practical way of monitoring the percentage of saturation, which in turn indicates the degree of buffering capacity. Yet in most workshops the effectiveness of the deacidification solutions is not checked, thereby risking the value of the individual preservation deacidification treatment.

Although precise methods for controlling aqueous deacidification and buffering procedures are readily available, these controls are not foolproof because the documents themselves are so variable. New techniques are needed to predict with a reasonable degree of accuracy, the full effects of any given treatment (there is for instance no easy way of measuring the alkaline reserve in treated paper). It is, unfortunately, not generally known that there is no correlation at all between the pH and the alkaline reserve in a paper.

With polyester film and the acrylic double-coated tape used for sealing the film, experimental work of age-testing indicates that in the equivalent of 500 years natural aging there is little or no real deterioration. Other experimental work has shown that the strength of lamination is simply not in the same class as polyester film encapsulation. The polyester treatment provides additional protection to documents, for no matter how brittle the paper becomes it is nearly impossible to fracture it after it has been encapsulated in the polyester

film using a four-edge seal.

It is suggested that anyone interested in the preservation of the paper collection ought:

—to evaluate their present procedures in terms of the potential damage to the paper being treated;

—to consider seriously using some of the newer and safer procedures available;

—and to remember that no single treatment is appropriate for all preservation problems, but that the best treatment is the one that does the least harm in both the long and the short term to the items in the collection.