Beta-ray Examination for Stamps on Cover

A.I.E.P. 60th Anniversary

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The technique was pioneered by W.H.S. Cheavin, who was one of the first to apply scientific inspection for philately in the early twentieth century. He used beta rays to show a large star watermark on an early cover, indicating that it was use of the first trial printings of 1855.

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Carbon 14.

This is the radioactive isotope of carbon, which deteriorates over time to normal carbon. With a half-life of 5,730 years, it is used by archaeologists to determine the age of old organic samples. Essentially, ^{14}C decays at a reasonably constant rate.

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People in the Morgan Library laboratory were very helpful, and interested in the project.

Testing protocol:

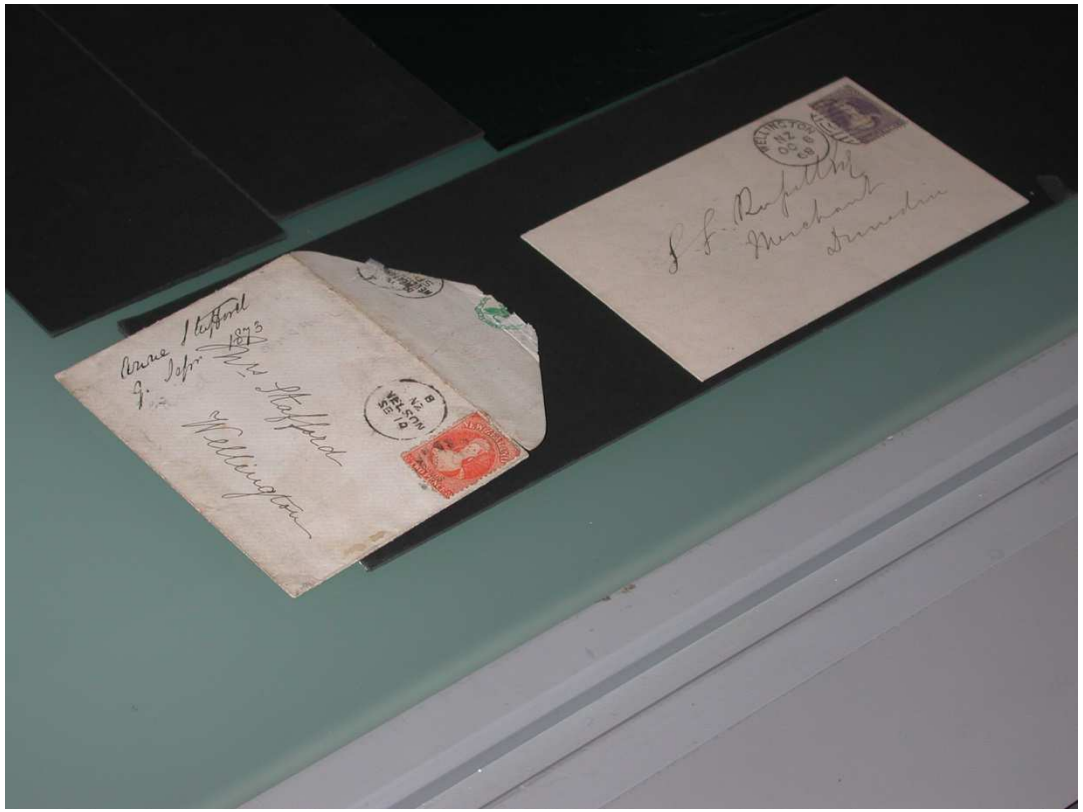
Two covers with early New Zealand were selected for potential usefulness.
The first has a 3d stamp, of which all copies have a large star watermark.
The exposure to beta rays should show the watermark if the length of the exposure is correct.

Testing protocol:

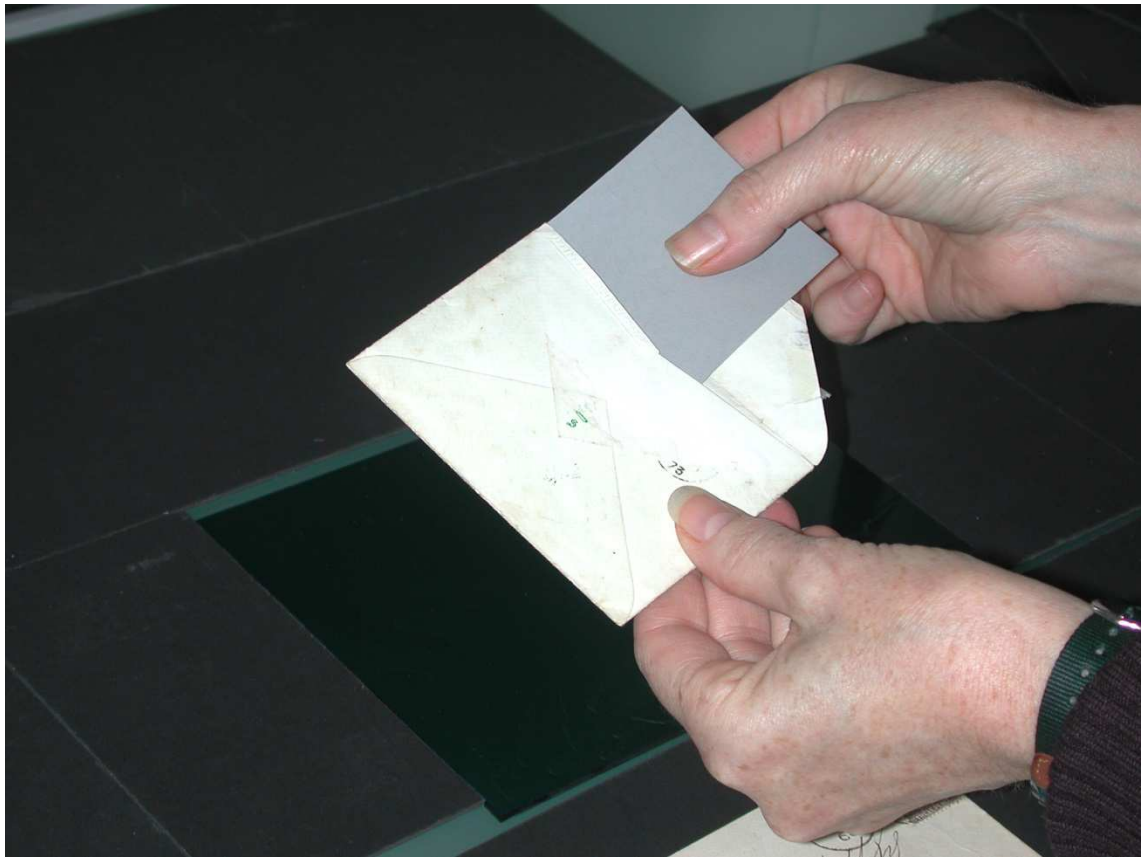
The second has a 2d stamp, dated during the last half of 1873. The date is important, since the large star paper supply ran out in mid-1873. Substitute papers were used until the end of the year. Most of those did not have watermarks, but some had papermakers' watermarks.

The equipment.
A special Kodak film is needed for the process, and handled in a darkroom.

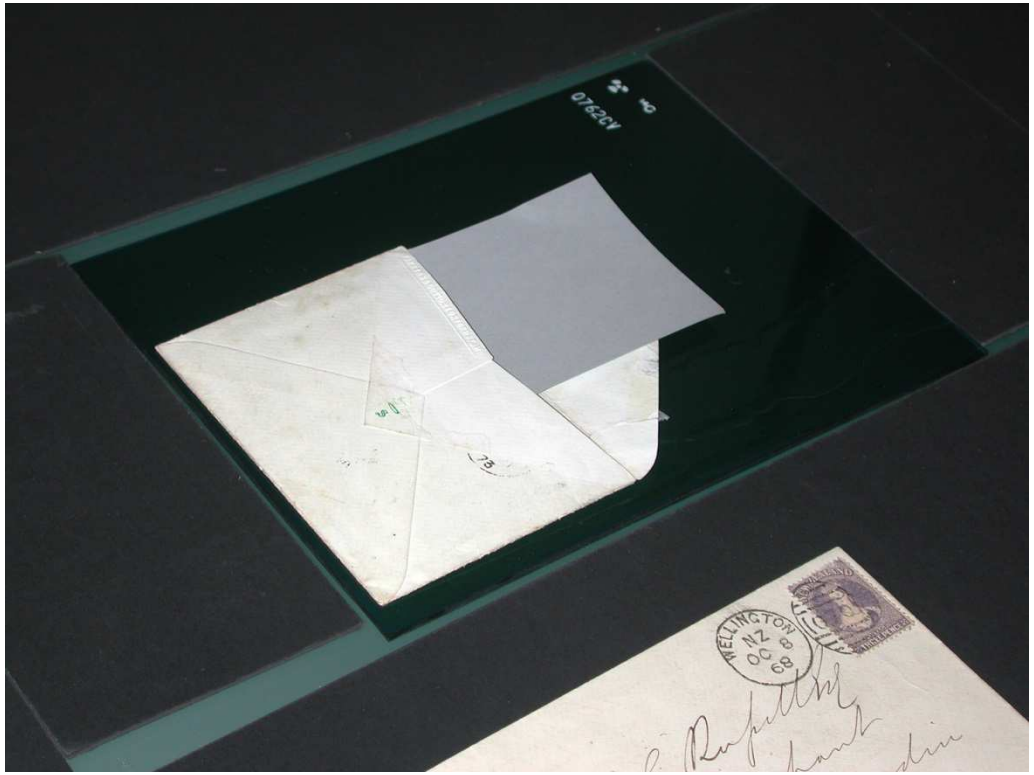
The two covers were exposed at the same time, to be sure that the exposure duration was identical.



Film was inserted inside the cover behind the stamp, since the beta rays would not penetrate more than two thicknesses of paper.



The covers were then placed face-down on the beta ray emitting surface.



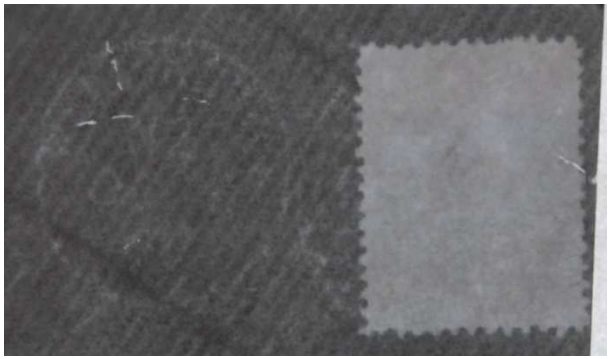
A soft “beanbag” was placed on the cover to keep it flat and to prevent it from shifting position.

Prepared for exposure. Initially, we calculated a 12-hour exposure time.

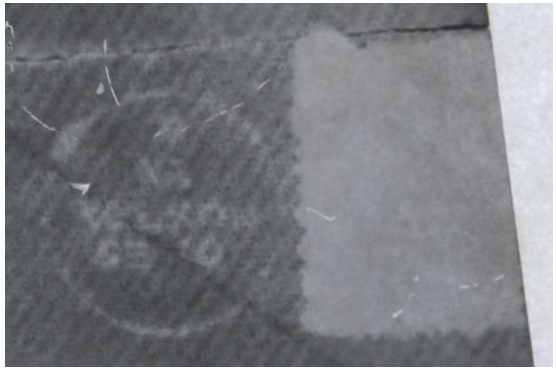
The lid of the table was closed for the duration of the exposure.

First results: The exposure was not long enough. The probable reason is the paper thickness. We made a second trial, using 24 hours for exposure.

The results were better. When the negative was viewed on a light-table, the star watermark was visible. The image of the negative shown below is not completely clear. The negative is shown beside the scan of the stamp and cancellation, and the inverse of the negative is below that.



Results: The second exposure series shows a faint outline of what may be the lozenges watermark on the 2d stamp (SG 142). Further testing is needed to confirm that possibility.



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Availability of facilities where the work can be done is very limited.

Thank you!

Questions?