Edme Jean Pigal: Les gorets! (1820s) hand-coloured lithograph, Chatsworth print collection © Duke of Devonshire, 2014.

Treatment Proposal

LES GORETS!

Kelly | VA0741 | 13030862

Table of contents

List of Tables

1. Introduction

Two conservation treatment options are proposed in this document of increasing interventive levels. The first treatment proposes a first-aid approach, recommended to minimise time and costs. The second treatment is the more interventive treatment, using a series of aqueous methods to improve the longevity of the object. The second treatment also aims to further improve the aesthetic of the print.

2. Treatment 1

Treatment 1 aims to:

- **Improve the physical stability of the object**
- **Provide a housing solution for storage**

2.1 Surface Cleaning

- Surface cleaning will be carried out on the recto and verso of the print using a soft brush across the entire surface. This will be followed by the grated Staedtler eraser[1] in areas without media.
- During cleaning, the print will be placed over a smooth sheet of Reemay® to reduce damage caused by abrasions
- The recto of the print will be cleaned first, to reduce any abrasions caused by loose dirt while cleaning the verso
- The torn edge of the print will be cleaned using the eraser, with a piece of blotter placed under to prevent catching of the surrounding edge

Risks	Benefits
• Possibility of causing more damage to the torn and areas of loss • Possibility of damaging the media • Possibility of damaging the support or changing the surface qualities of the paper	• Removal of particles that can facilitate degradation of the paper[2] • Improve the aesthetic of the artwork • Reduces abrasions caused by surface dirt

Table 2.1 Risks and benefits of surface cleaning

2.2 Mechanical reduction of accretions and metal particles

- Deposits will be removed under magnification using the tip of a no.15 scalpel blade
- If the accretions' are too small or thin, removal will not be attempted due to the risk of mechanical damage to the support

Risks	Benefits
• Possibility of causing physical damage to the support	• Improve the aesthetic of the artwork • Prevent particles from embedding deeper into the fibres of the paper during aqueous treatment

Table 2.2 Risks and benefits of mechanical removal of accretions

2.3 Infilling of losses

- Any curled or folded areas will be locally humidified using Sympatex® and damp blotter to relax the support, enabling realignment
- Areas of loss will be filled using an infill paper of similar texture, colour, and thickness, attached using dry wheat starch paste to avoid the introduction of too much moisture.
- Repairs will be weighted and allowed to dry under pressure under blotter and interweaving sheets of Reemay®
- Pinholes will not be repaired[3]

Risks	Benefits
• Introduction of too much adhesive may cause tensions around the repair, leading to distortions in the artwork • Excess adhesive may also cause tidelines to form due to the movement of soluble degradation products in the severely discoloured support • Local humidification may also cause tidelines if left unattended	• Improve the long-term physical stability of the artwork • Improve the visual integrity of the artwork

Table 2.3 Risks and benefits of repairing the artwork

[1] A type of eraser used in conservation as it is chemically inert, not physically disruptive to the paper, and of sufficient particle size to permit removal from the paper (Cowan & Guild, 2001).
[2] Such particles can disfigure, obscure, abrade, cause stains, and increase the acidity of the paper. Metal impurities found in dust and dirt can undergo hydrolysis with increases in relative humidity (RH), releasing sulphuric or nitric acids.
[3] Placing an infill over the pinholes may remove archival evidence

2.4 Humidification and pressing

- The object will be gradually humidified in a Sympatex® chamber to reduce rapid expansion in the paper
- The object will then be transferred to the nipping press and flattened between interweaving sheets of Reemay® and blotting paper

Risks	Benefits
• Moisture build up can cause condensation on the top of the chamber, which can drip onto the object, causing tidelines	• Allows paper fibres to relax • Controls stress in expanding paper[4]

Table 2.4 Risks and benefits of humidification

2.5 Housing

- The object will be wrapped in acid-free tissue and stored in a clamshell folder
- The clamshell folder will be made of an acid-free paper, that provides adequate support to the object

2.6 Recommendations for storage and display

Temperature	**20°C +/- 2°C**
Relative Humidity	50% +/- 5% with minimal fluctuations
Light	Display: 50 lux (exclude all UV light)

Table 2.5 Recommendations for storage and display

Advantages	Disadvantages
• Improves the stability of the object • Removes surface particles that can facilitate further degradation of the paper • Improves the visual integrity of the artwork through the filling of losses and reduction of undulations	• Discolouration of the primary support remains untreated, largely impairing the aesthetic of the print • High acidic levels still present in the primary support • Local treatment increases the risk of tidelines forming

Table 2.6 Advantages and disadvantages of treatment 1

3. Treatment 2

Treatment 2 aims to:

- **Stabilise the object so that it can be displayed or used in a collection**
- **Improve the physical and chemical stability of the object**
- **Improve the aesthetic of the object**
- **Provide a housing solution for storage**

3.1 Surface Cleaning

- See 2.1

3.2 Mechanical reduction of accretions and metal particles

- See 2.2

3.3 Humidification, washing and alkalisation

- This treatment is continued if spot testing of the media and support shows no sensitivity to deionised water, calcium hydroxide, and industrial methylated spirits (IMS).
- Humidification of the print will be introduced at a slow rate using a Sympatex® chamber, or using an ultrasonic humidification dome at 80-90% relative humidity (RH).

[4] (Brückle & Banik, 2012)

Risks	Benefits
• Moisture build up can cause condensation on the top of the chamber, which can drip onto the object, causing tidelines	• Allows paper fibres to relax • Prevents uneven wetting or flooding of the object during washing • Controls stress in expanding paper[5] • Makes washing treatment more effective[6]

Table 3.1 Risks and benefits of humidification

- The print will be float washed[7] or washed on the low-pressure table[8] using deionised water[9], with an interweaving layer of Reemay® to provide additional support to the object during and after treatment, minimising risks of physical damage[10].
- Subsequent treatments will involve the addition of an alkaline. Both Calcium Hydroxide ($Ca(OH)_2$) and Magnesium Hydrogen Carbonate ($Mg(HCO_3)_2$) will be considered in situ, depending on the needs of the object.

Alkaline solution	Advantages	Disadvantages
Calcium hydroxide	Greater retention and better neutralisation of carboxyl groups[11] Neutralises all carboxyl groups Simple to prepare Cost effective Good light stability	Maximum amount of alkaline reserve is limited, but may be sufficient[12]
Magnesium hydrogen carbonate	Higher alkaline reserve Good for highly acidic or degraded paper	Weak acidic groups will not be neutralised Difficult to prepare Poor light stability[13] May cause gritting on the paper surface

Table 3.2 Advantages and disadvantages of calcium hydroxide and magnesium hydrogen carbonate

- Alkalisation will be continued until no further discolouration is released from the paper

Risks	Benefits
• May cause irreversible changes to the support and media in the form of colour, texture, opacity, loss of coatings and sizing[14] • Torn and damaged areas are weaker when the support is fully saturated, leading to the possibility of greater damage during handling • High pH levels may induce alkaline degradation, causing chain scission in the cellulose structure (especially so with Magnesium hydrogen carbonate) • Gritting on the surface may occur • The use of the low pressure table may cause uneven drying, distortions, and dimensional changes in the paper[15]	• Improves the long-term stability of the object by removing discolouration, water soluble pollutants and harmful degradation products[16] • Increase strength and flexibility of the paper • Alkalisation removes soluble acidity and neutralises acids in a paper • Leaves an alkaline reserve in the paper • Improves the aesthetics of the object

Table 3.3 Risks and benefits of washing and alkalisation

3.4 Drying

- The object will undergo controlled drying in between treatments to minimise rapid contraction of the paper, which can lead to undulations and tensions in the support. The object will be placed in a plastic tray, over a sheet of fresh blotter. A sheet of Perspex® will be placed over the top of the screen, leaving a slight gap for airflow.

---

[5] (Brückle & Banik, 2012)
[6] (Hey, 1979)
[7] The object will be suspended on the water surface
[8] Suction is applied to press the paper onto an absorbent material, directing the flow of water through the object. Strips of blotter can be placed just touching the edges of the object to increase capillary action, drawing discolouration from the object.
[9] Deionized water is void of metal ions, chlorine and organic impurities
[10] (Hey, 1979)
[11] (Hey, 1979)
[12] (Smith, 2012: p. 369)
[13] (Hey, 1979)
[14] (Paper Conservation Catalog, 1985)
[15] (Albro *et al*. 2008)
[16] (Tse, 2001)

3.5 Repair and filling of losses

- Repair of the losses in the support will be carried out using the direct application of pulp at smaller areas (pinholes), and using a casting box over the larger areas. Pulping will be done over the fritted disc.
- The pulp will be created to match the colour of the support and will be applied to the same thickness. Magnesium hydrogen carbonate will be added to the pulp to increase the pH of the repairs.
- Several tones of pulp will be made, and swatches will be created to ensure the best tonal match

Risks	Benefits
• Object will be placed face down and introduced to relatively large amounts of water • The use of the low pressure table may cause uneven drying, distortions, and dimensional changes in the paper	• Greatly improves the aesthetic of the object • Greatly improves the physical stability of the object (the edges will be less likely to catch on other material, leading to physical damage)

Table 3.4 Risks and benefits of pulp repairs

3.6 Drying and flattening

- The object will immediately be transferred to the nipping press after pulping treatment, to prevent the pulp repairs from detaching
- It will be pressed between similar textured sheets of Reemay to ensure the texture on the repairs match those on the print support, and blotting paper
- Pressing will also ensure the object dries flat

3.7 Housing

- See 2.4

3.8 Recommendations for storage and display

- See 2.5

Advantages	Disadvantages
• Improves the physical stability of the artwork via pulp repairs • Improves the chemical stability of the artwork by removing soluble degradation products in the support • Improves the aesthetics of the artwork by reducing surface dirt, discolouration, and by repairing and filling losses along the edges of the print	• Treatments may cause irreversible changes to the size, thickness, texture, colour and strength of the artwork • Risks of tidelines forming in the artwork due to aqueous treatment • Insoluble degradation products will remain in the paper

Table 3.5 Advantages and disadvantages of treatment 2

4. Conclusion

Although the object will be exposed to more risks due to the interventive treatments in treatment 2, the improvements to the physical and chemical stability, as well as the aesthetic will greatly increase the longevity of the object, allowing it to be handled and displayed.

5. Bibliography

Albro, S., Biggs, J., Dekle, C., Haude, M., Karnes, C. and Khan, Y. (2008) 'Developing Guidelines for Iron-Gall Ink Treatment at the Library of Congress', *The Book and Paper Group Annual*, 27, pp. 129-165.

Bruckle, I. and Banik, G. (2012) 'The Introduction of Water into Paper', in Banik, G. and Bruckle, I. *Paper and Water*. New York: Routledge, pp.255-288.

Cowan, J. and Guild, S. (2001) *Technical Bulletin 11: Dry methods for Surface Cleaning Paper*. Ottawa: Canadian Conservation Institute

Hey, M. (1979) 'The Washing and Aqueous Deacidification of Paper', *The Paper conservator*, 4(1), pp. 66-80.

Smith, A. (2012) 'Aqueous Deacidification of Paper', in Banik, G. and Bruckle, I. *Paper and Water*, pp. 341-388. New York: Routledge.

The Book and Paper Group of the American Institute for Conservation of Historic and Artistic Works (1985) 'Chapter 20: Alkalization and Neutralization' in *Paper Conservation Catalogue.* 2nd edn. Washington D.C.: American Institute for Conservation Book and Paper Group.

Tse, S. (2001) 'Effect of water washing on paper and cellulosic textiles: An overview and update of CCI Research', *The Book and Paper Group Annual*. 20, pp. 35-39.