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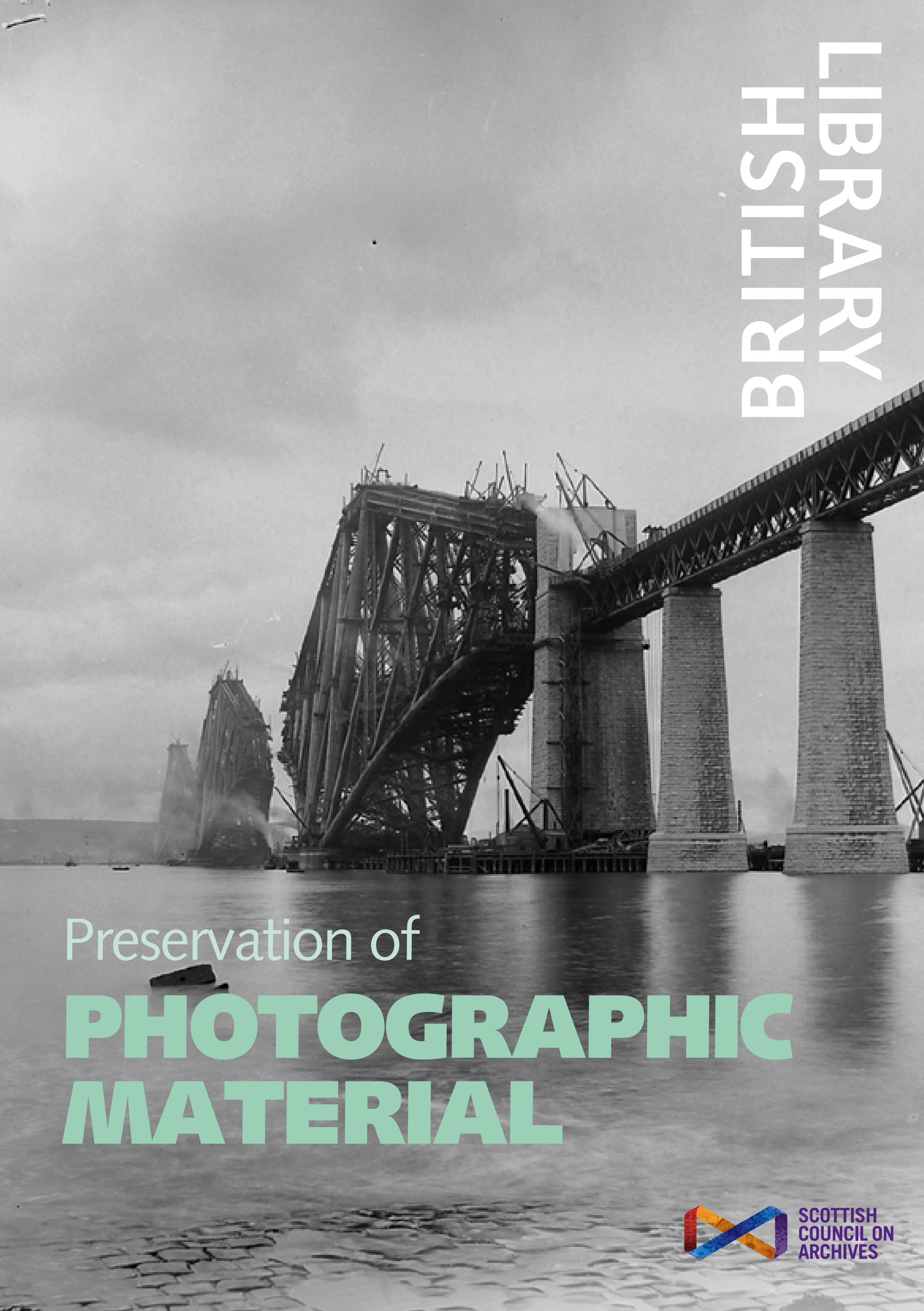

Preservation of PHOTOGRAPHIC MATERIAL

SCOTTISH COUNCIL ON ARCHIVES

Photography in the Archives: the Scottish Role and Experience

Photography holds a distinctive place in the culture and history of Scotland. It is the art form, which was practised here to its highest level from the very beginnings of the art in the 1840s, and it has notably influenced world photography since that time.

In the early years, Scotland's involvement was critical. Even before the first announcement of the invention, there was a positive experimental and observational interest in optics and the camera, and in light sensitive chemistry. By 1839, when Louis Jacques Mandé Daguerre announced the invention of the daguerreotype in France and William Henry Fox Talbot produced the first effective negative/positive process in England, the nation's energies were turned to scientific and aesthetic experiment. Such figures as Dr Andrew Fyfe 1792–1861, a lecturer in practical chemistry and later professor of chemistry at Aberdeen, engaged in inventive exploration of photography; David Octavius Hill and Robert Adamson with Jessie Mann, working with Talbot's calotype process in Edinburgh in the 1840s, set a phenomenal standard of chemical and aesthetic excellence.

By the mid 1850s, with the technical improvements which made it commercially practical, the art took on its democratic and revolutionary character. Most people could now afford portraits of their own families – a privilege which had belonged only a decade before to the prosperous. Parents could see the children of their own children, lost to them through migration; criminals could be pursued across the Atlantic; scientists and artists could exchange visual information and build the intelligence of their study; great works of engineering could be seen in progress to convince distant investors. The invention of stereoscopic photography enabled people to see the world in three dimensions from their armchairs.

Both amateur and professional photographers travelled widely, and the Scots made a direct impact on international practice and visual understanding: Alexander Gardner in America; William Notman in Canada; William Carrick in Russia; John Thomson in China. People collected photographs as visual memories and inspiration. Lecturers performed with flaring lanterns and glass slides. Photograph albums in handsome bindings sat beside the Bible on the parlour table.

The visual image – principally photography – is radically different from the written word. Some photographs will have immediate impact, others we need to examine carefully. It is, like any other picture, a translation of reality, not a facsimile: it is flat and still. It allows us to look at length, and look again, while reality streams past and is gone. We are, astonishingly, able to look at the past, last week or a hundred years ago to see what our ancestors saw.

As a form of communication, the photograph goes further than the written word. Its study should flourish within the magnificent collections housed in the archives, not just as passing illustration, but as evidence of national intelligence, life and culture.

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Front cover The Forth Bridge from the Hawes Pier, Evelyn Carey, 1889, National Records of Scotland: BR/FOR/4/34/164 (Crown Copyright).

Preservation of photographic material

Introduction

Photographs are housed in libraries, archives and museums all over the world. Practical photographic conservation treatment provides an option for photographs that are damaged or have deteriorated. However, it is also possible to prolong the life of a photograph through good preservation practices in handling, housekeeping and storage. This booklet describes the most common historical photographic processes, outlines the causes of deterioration and provides guidelines on good preservation practice. It is aimed at people working or volunteering in libraries, archives and museums whose responsibilities include working with photographic collections. Whilst the booklet focuses on historic black and white or monochrome photographs, much of the information is applicable to colour photographs and other imaging materials such as microfilm, x-rays and motion picture film.

What is a photograph?

A photograph is an image produced by the action of light. The light initiates a chemical reaction which leads to a long-lasting chemical change in a light-sensitive compound bound to a support. The support is usually made of paper, plastic, glass, or metal, but is sometimes made from other materials such as leather or cloth. Photographic images are usually continuous in tone, meaning changes in shading between light and dark are gradual and no patterns are seen, such as the regularly spaced dots or grids found in photomechanical printing processes.

History

Photography was officially invented in 1839 with the public announcement of Louis Jacques Mandé Daguerre's daguerreotype process in France and William Henry Fox Talbot's photogenic drawing process in England. The Daguerreotype process relied on a sensitised silver coated copper plate which was exposed in a camera and after processing became a unique positive. W H F Talbot's process produced a silver image on a paper support. However W H F Talbot, together with Sir John Herschel, very quickly realised the importance of having a negative (where light and dark areas are reversed) from which one could make multiple positives. In 1840 W H F Talbot invented the first negative-positive process. He also introduced the use of sodium thiosulphate as 'fix' which removed the unexposed silver salts after the image was produced so that the image did not continue to blacken all over when displayed. The chemicals and the essence of these processes continue to be used in black and white photography to the present day, even in some types of digitally generated prints. For this reason, W H F Talbot can be said to have laid many of the foundations of modern photography.

In the following decades many new processes appeared and the mass photography market grew rapidly. Towards the end of the 19th century and in the early 20th century a number of processes were introduced with the purpose of producing longer lasting images or more artistic effects. These processes used metals other than silver, or pigments. They are often referred to as 'alternative processes' meaning alternative to mainstream silver processes. At the end of the 19th century and in the early 20th century, photography became more reliable and consistent. Emulsions[1] were introduced which were sensitive to the whole spectrum of visible light and printing paper was exposed to negatives in darkrooms rather than in daylight, producing repeatable results. The first commercial colour process, the autochrome process appeared in 1904. Throughout the 20th century dye-based colour photographic processes were developed, expanding our photographic legacy. The first digital camera appeared in 1981 and by the turn of the 21st century digital photography had started to generate images produced by other printing methods not based on light, alongside traditional photographic processes.

Identification of photographic processes

Identification of photographic processes may serve different purposes. It may be necessary to date a photograph or its subject matter, to authenticate its provenance, or to determine a possible conservation treatment. The identification of photographs can be daunting. Throughout the 19th and 20th centuries, many processes appeared and many passed out of fashion. However, the vast majority of photographs belong to a relatively small group of common processes, within which many of the same materials occur repeatedly. Examples of photographs that fall outside this group are rare. In most historic black and white photographs, the image is made from silver, but it can also be made using other metals, commonly iron, platinum and palladium, or from pigments, which were used in the carbon and gum bichromate processes. Photographic processes can be identified using various methods. Some methods are only available to experts, but many photographs can be identified with the naked eye, or low power magnification including hand lenses. Good reference books and online resources are valuable aids. The table overleaf also provides identifying features of some of the common processes.

Causes of deterioration

Photographs are particularly vulnerable to physical, chemical and biological damage and deterioration. Handling, poor quality environments and storage materials all have an impact on the condition of photographs. Images created through certain photographic processes are more sensitive than others, but all photographs are sensitive to poor environmental conditions. High temperature and high relative humidity (RH) will increase the rate of chemical and physical deterioration, for example causing tarnishing, fading and discolouration of silver images. Colour images may also fade and some early cellulose acetate film supports will break down. High temperature and low RH can cause cracking and flaking emulsion. High RH increases the risk of mould growth and insect damage. Light can cause fading, particularly of cyanotypes[2], many chromogenic colour[3] images and some silver images.

Handling

When handling photographs always work on a clean, clear surface of sufficient size. The area should be cleaned with a dry or lightly dampened cloth first, to remove particulate dirt which causes scratches and chemical deterioration. (Cleaning agents should not be used). If necessary, cover the surface with cheap, plain paper, such as unprinted newspaper, which can be changed as soon as it becomes dirty. Examine photographs in light which has been ultra-violet filtered.

In order to minimise the risk of damage:

- Photographs should be handled as little as possible.
- Wherever possible provide a copy print or digital access rather than an original print to reduce the risk of damaging the original. However, care should always be taken to ensure that the process of copying or scanning the original does not damage it and some photographs may be too fragile to copy or digitise.
- Supervise anyone who handles photographs, particularly new or untrained members of staff or users.
- Wash hands before examining photographs. Hands should be clean and free of lotions and creams. Wearing nitrile gloves is useful for handling dirty containers or outer coverings. However, particularly if gloves are loose-fitting, their use makes it hard to judge the condition of material, reduces dexterity and increases the risk of damage.
- Use two hands to hold the photograph and if possible, support it with a piece of stiff card, especially if the photograph is fragile or brittle. This will reduce the risk of physical damage. Avoid touching the image surface.
- Remove envelopes from negatives and not vice versa. If a photograph appears stuck to its container, do not attempt to remove it.
- Use book supports with photographic albums.
- Do not stack loose prints or glass plate negatives on top of each other or place anything on top of photographs as this will damage the surface.
- Do not attempt to flatten rolled or curled prints – they may crack and tear.
- Do not use adhesive tapes, staples, pins, metal paper clips or rubber bands.
- Do not eat, drink or smoke near photographs.
- Do not use ink to label a photograph. Use a HB pencil to write on the reverse of material and do not press hard.

[1] Emulsion is the term used to describe the suspension of a light-sensitive compound in a binder e.g. silver bromide in gelatin.

[2] Cyanotypes are brilliant blue prints formed from iron salts on paper.

[3] Chromogenic images are multicoloured dye images.

Aid to identification of the most common black and white historical photographic processes and supports

	Date of Invention/ Introduction (Period of greatest popularity)	Image	Emulsion (if any)	Support	Typical Presentation: Loose(L), Mounted(M), Case(C) Framed(F) Albums(A)	Identification
Daguerreotype	1839 (–1850's)	Silver and silver/ mercury amalgam	_	Silver coated copper Plate	C/F	Unique; negative/positive image in raking light
Photogenic Drawing	1834/1839 (1840's)	Silver (P.O.P.[1])	_	Paper	L	Paper fibres visible; sepia – lilac brown
Salted Paper Print	1839 (1840's–1850's)	Silver (P.O.P)	_	Paper	L/M/A	Paper fibres visible; sepia – reddish brown
Calotype Print	1841 (1840's–1851)	Silver (physically developed[2])	_	Paper	L/M/A	Paper fibres visible; sepia, but more contrast than above
Waxed Paper Calotype Negative	1841 (1840's–1851)	Silver (physically developed	_	Paper	L	Waxed and translucent
Cyanotype	1842 (1840's and 1880's–1890's)	Iron compounds	_	Paper	L/A	Paper fibres visible; blue colour
Wet Collodion Negative	1851 (–1870's)	Silver (physically developed)	Collodion	Glass	L	Hand-coated; finger marks in emulsion and varnish at corners of plate; may be creamy colour in dark areas
Collodion Positive	1852 (–1880's)	Silver (physically developed)	Collodion	Glass	L/F	Unique; no negative/positive image in raking light; black backing or ruby glass
Tintype	1856 (–1930's)	Silver (physically developed)	Collodion	Iron	L/C/F/A (Card Folders)	Cased tintypes: test with magnets over cover glass (magnetic field); rust blisters
Albumen	1850 (–1890's)	Silver (P.O.P.)	Albumen	Paper	L/M/F/A	Usually finely crazed emulsion; yellowish sepia; thin paper base; tendency to curl
Collodio-Chloride	1864 (1880's–1910's)	Silver (P.O.P.)	Collodion	Paper	L/M/F/A	Appears like gelatin P.O.P.
Platinum	1873 (1879–1914)	Platinum		Paper	L/M/F/A	Paper fibres visible; degraded transfer image on facing paper; little image fading
Gum bichromate	1856 (1890's-1920's)	Pigment	Gum arabic	Paper	L/M/F/A	May be glossier in darker areas; may be slight relief in image; pigment particles visible under low magnification; pigment colour
Carbon print	1855/64 (1868–1940's)	Pigment	Gelatin	Paper	L/M/F/A	May be glossier in darker areas; more pronounced relief image; little image fading; pigment colour
Gelatin dry plate negative	1871/73 (–1930's)	Silver (chemically developed)	Gelatin	Glass	L	Usually non-image strip near border; smooth, even thin coating
Silver gelatin fibre / paper based prints	1882 (–1960's) P.O.P.[3] 1873 (–1960's) D.O.P.	Silver (P.O.P. & D.O.P.)	Gelatin	Paper	L/M/F/A	Very pronounced tarnish mirror for D.O.P. sometimes
Cellulose nitrate	1889 (–1950)	Silver (chemically developed)	Gelatin	Cellulose nitrate	L/Plastic or paper wallets	Sometimes edge printed: "CELLULOSE NITRATE"
Cellulose acetate	Late 1920's (to present)	Silver (chemically developed)	Gelatin	Cellulose acetate	L/Plastic or paper wallets	Sometimes edge printed: "SAFETY"
Polyester	1940's/50's (to present)	Silver (chemically developed)	Gelatin	Polyester	L/Plastic or paper wallets	Not usually edge printed
Resin-coated paper	1972 (to present)	Silver (chemically developed)	Gelatin	Polyethylene coated paper	L/M/F/A	Tends to lie flat; more plastic than plain paper supports

[1] P.O.P. are printed out prints. This means that the sensitised printing paper is exposed, in contact with a negative, to light (usually daylight) until the final image appears. The printing paper is then fixed and washed. There is no development stage. They are usually sepia in colour.

[2] Physically developed images use silver ions from the developer which are deposited on the silver of the latent image. The silver does not usually come from the photographic emulsion itself, unless it has been dissolved in the developer solution first.

[3] D.O.P. are developed out prints. In this case the sensitised printing paper is exposed, (usually under an enlarger) to artificial light for a shorter period of time than P.O.P. This produces a latent image which is not visible to the human eye. The printing paper is then placed in a developer until the image appears. The silver in the image comes from the sensitised paper itself. After this, the printing paper is placed in a stop bath, fixed and washed. It is much quicker to produce than a P.O.P. and the process is more controlled and the results more predictable.

Housekeeping

Simple steps can be taken to improve conditions for photographic materials, slow their deterioration and act as an early warning system if damage is occurring.

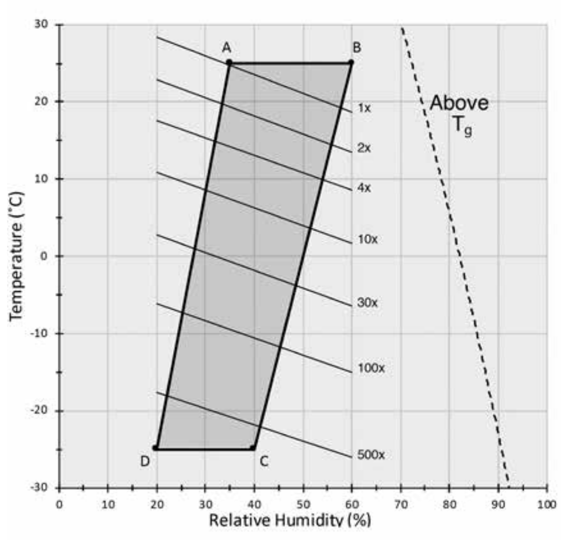
- Monitor and control temperature and relative humidity.
- Regularly check for mould, insect or rodent activity and other signs of deterioration.
- Remove damaged photographs and store separately.
- Keep research and storage areas clean. These areas should be regularly cleaned using a vacuum with a HEPA (high efficiency particulate air) filter, not swept. Apart from causing a build-up of surface dirt, dust increases the risk of mould and can also cause scratches and blemishes on photographs.
- Avoid using household cleaners containing ammonia or chlorine in collection areas.
- Do not store or place photographs near a heat source such as a hot water pipe, or hang them above a radiator.
- Do not store or place photographs in direct sunlight. All light sources should be UV-filtered.
- Do not store photographs in freshly painted rooms or near freshly painted objects for at least two and preferably four weeks.
- Do not store or place photographs near photocopying machines. They emit ozone which will damage photographs.
- Avoid using carpets in storage areas. Carpets can harbour insect pests and dirt. Woollen carpets can emit gaseous compounds of sulphur, which will damage photographs.

Environment

There are a number of environmental factors that affect photographs: temperature, relative humidity, air purity and light are the most important.

Temperature and relative humidity

Unsuitable temperature and relative humidity (RH) can cause or accelerate physical and chemical damage. Considerable research has been carried out into the optimum storage environment for photographs. This has resulted in a minimum standard of a physically safe range of parameters of temperature and RH for photographs, based on the physical stability of photographs with a gelatin binder. Within these parameters there are varying degrees of chemical stability. Within the physically safe RH range, photographs will not undergo irreversible physical changes e.g. cracking emulsions and flaking. This humidity range varies according to temperature, as shown in the following diagram.



The darker grey quadrant *abcd* defines the physically safe range of temperature and RH for photographs. Outside the quadrant, the dotted line shows the glass transition temperature (Tg) of gelatin, which varies according to RH. This is the temperature at which rapid image degradation is likely to occur. The diagonal contour lines (1–500) map relative chemical stability. If a photograph is stored in the environment defined by line 10 it will take 10 years longer to reach the same stage of chemical deterioration as a photograph stored in the environment defined by line 1. Lowering the RH within the quadrant at a fixed temperature will only increase the chemical stability by a factor of 2–3. However, lowering the temperature at a fixed RH can increase the chemical stability by a factor of more than 100. Therefore, the beneficial effect of dropping the temperature within the quadrant, as opposed to the relative humidity, even by a small amount, can clearly be seen. There is considerable advantage to be gained by cold storage for more unstable material.

Conservation heating

The above graph has implications for the effectiveness of expenditure in designing storage. Initially it can be used to select a suitable level of chemical stability for a collection. This is dependent on what is already known about the stability of the particular photographic materials in the collection and how long the photographs need to be kept in an acceptable condition. Within the physically safe quadrant it is easier and more cost effective to achieve the desired chemical stability by allowing a relatively broad range of relative humidity and narrow range of temperature (within the physically safe quadrant). However, some historic buildings without air conditioning tend to be cool but damp, particularly in winter. In such buildings heating systems can be activated by relative humidity levels. Collections will benefit from increased chemical stability as temperatures slowly drop, but if the RH goes above the physically safe level, the heating comes on and the RH falls to maintain physically safe levels. This is known as conservation heating.

Environmental targets

There are a number of ISO[4] standards that recommend temperature and relative humidity levels for the long-term storage of specific photographic materials. Whilst these standards should be consulted, it is acknowledged that they may be difficult to achieve, especially when institutions hold mixed photographic collections. As well as summarising the recommendations of these standards, *BS ISO 18934:2011 Imaging materials. Multiple media archives*. *Storage environment* describes how good a particular storage environment is for different types of photographic material. The four storage environments considered are sub-zero, cold, cool and room temperature and for each type of material they are categorised as unsuitable, fair, good or very good. The temperature and RH parameters for each storage environment are shown below. Whilst unsuitable storage environments should be avoided it is likely that compromises will have to be made for some types of material. However, it should help you to decide which types of material would benefit the most from cold, cool or sub-zero storage.

	Temperature	RH
Sub-zero	-20°C – 0°C	30–50
Cold	0°C – 8°C	30–50
Cool	8°C – 16°C	30–50
Room	16°C – 23°C	30–50

From *BS ISO 18934:2011 Imaging materials. Multiple media archives. Storage environment*

The following recommendations are generalisations only and there may be exceptions. If there are concerns about particular photographs, professional advice should be sought.

- Generally, photographs on glass or metal supports are best stored at cool or cold temperatures.
- Cellulose nitrate and cellulose acetate should not be stored above cool temperatures and it is preferable to keep them in cold or sub-zero conditions.
- Cellulose acetate film based negatives from the 1950's should be in sub-zero freezer storage.
- Later black and white film base from approximately the 1980's onwards can be kept at cool temperatures and below.
- Most early colour film and colour prints should be in cold or sub-zero storage.
- Black and white prints can be stored at room temperature and below, depending on condition.

[4] ISO standards are published by the International Organization for Standardization. ISO standards adopted as British Standards are given the prefix BS ISO.

Cold storage

The term cold storage can be used to describe temperatures below 16°C (cool) but it is usually used to describe lower temperatures (cold and sub-zero). There are two methods for storage at low temperatures. Either photographs can be stored in a controlled open environment (cold/cool) such as a humidity-controlled vault or they can be sealed in purpose-made enclosures and stored in freezers. At lower temperatures it is more difficult and costly to control the higher RH, which should be kept within the physically safe quadrant, defined in the diagram above. Sealed enclosures provide microenvironments in which an appropriate RH can be maintained. They usually have warning strips that indicate if the outer packaging has been punctured and the RH has increased beyond the safe range. Sub-zero storage is especially suitable for large quantities of photographs with a plastic base, particularly early safety film (cellulose acetate)[5] used for negatives (black and white and colour) and transparencies (slides). These chemically unstable photographs can be difficult to treat and conservation treatment of large quantities is not usually practical. Ideally, access copies of original photographs should be made before they are placed in sub-zero storage, but where substantial quantities of photographs are deteriorating rapidly, it may be necessary to place them in subzero storage first and remove small quantities at a time for copying. If originals need to be accessed they should be acclimatised within their packaging before use. Provided photographs are brought up to room temperature whilst in sealed packaging, the acclimatisation period for some packaging kits need only be 2–3 hours. It is cost effective to purchase packaging which can be re-used. The process of acclimatising photographs to room temperature and replacing them in cold storage should not cause physical damage, provided they are always packaged in a physically safe environment first and later acclimatised from freezer storage to room temperature before opening. Frequent periods of use at room temperature involving the removal of an object from cold storage will clearly lessen the advantage of the increased chemical stability provided by cold storage.

Cellulose nitrate film – a warning

Cellulose nitrate film was produced extensively between 1889 and 1939 and continued to be used up to c.1950 as a support for negatives, transparencies, x-rays and motion picture film. Some cellulose nitrate motion picture film was used after this date as old stock was used up. Cellulose nitrate film can be extremely dangerous in certain circumstances, as it is highly flammable and can have a relatively low temperature of ignition of 38ºC when in poor condition and kept at that temperature for extended periods. However, the issue of flammability should not be confused with that of stability, which is generally good and much better than for early cellulose acetate film. After all, cellulose nitrate was produced for many years and used by many people satisfactorily. Small quantities in reasonable condition stored at cool temperatures away from sources of heat (such as sunny windows

[5] For more information about safety film refer to Reilly, J. M., IPI Storage Guide for Acetate Film, 1993. filmcare.org/pdf/acetate_guide.pdf

or hot water pipes) or sparks should not present a considerable risk. However, as quantities increase, purpose-built storage needs to be provided with adequate fire prevention. The greatest risk is with large amounts of densely packed material in poor condition and very large quantities will require storage in a separate building. There are considerable health and safety issues attached to any cellulose nitrate collection and the specific requirements for their safe storage and handling should be strictly adhered to, thereby avoiding unnecessary risks[6].

Once cellulose nitrate begins to burn, it produces gases which catalyse further decomposition and affect surrounding materials. Highly toxic fumes, as well as smoke and heat, are produced very quickly. It can continue to burn where there is no external source of oxygen. It is also worth noting that if the buildings or contents are insured, the policy may prohibit the storage of cellulose nitrate film. If the material is in very poor condition and beyond use contact the local authority or fire brigade for advice on disposal[7].

Air purity

A number of atmospheric pollutants are capable of oxidising silver in photographs. These include ozone, peroxides, nitrogen oxides and sulphur-containing compounds such as sulphur oxides and hydrogen sulphide. Air should be filtered, especially in collections housed in industrial areas. Avoid using materials or equipment which emit pollutants, certain paints and varnishes, photocopying machines, woollen carpets and new wood. Building work and decoration can introduce contaminants, and photographs should be removed from these areas until pollutants have fallen to acceptable levels and the area has been thoroughly cleaned.

Light and display

In storage and display areas, lights should be fitted with UV filters. Ultra-violet radiation is the most damaging type of light for photographic material. When framing prints for display use UV filtered glass or polymethyl methacrylate e.g. Perspex™. Blinds and UV-filtering film can also be used to reduce light levels.
A light level of 50 lux is the maximum recommended display level and no photographs should be exposed to light levels of more than 100 lux for extended periods. Photographs should not be on permanent display, but should be rotated. Particularly sensitive photographs should not be displayed at all. The materials used for mounting display prints should conform to the same standards as the enclosure materials.

6 Refer to *NFPA 40: Standard for the Storage and Handling of Cellulose Nitrate Film*, Quincy: National Fire Protection Association, 2019

7 Refer to the HSE leaflet *The dangers of cellulose nitrate film*, London: Health and Safety Executive, 2013. hse.gov.uk/pubns/indg469.pdf

- Silver gelatin prints that have been processed according to instructions are essentially stable at low light levels.
- Most 19th century photographs, particularly from the earliest years of photography should not be displayed for long periods. The earliest photographs were experimental in nature and may be unsuitable for display.
- Other materials which may be particularly susceptible to light damage include early colour film and colour prints, cyanotypes and early resin coated prints.

Housing

Many types of housing are unsuitable for photographic storage and this is a common cause of damage to photographs. Good quality storage materials are available in paper, board and plastic and their use will significantly enhance the longevity of photographs[8].

Paper used for housing should:
- have a high alpha-cellulose content (above 87%).
- have a pH of 6.5-7.5.
- have an undetectable, reducible sulphur content.
- be free of lignin, pH buffers, metal particles, acid, peroxides and harmful sizing agents.

Photon™ paper and Argentia paper are both made from 100% cotton fibre and are particularly suitable for photographic storage. Museum boards, such as Heritage TG Off White and Dull White can be used for framing and additional supports or barriers. Unbuffered materials are generally considered the most appropriate for photographs. Buffered box boards housing photographs protected by individual unbuffered enclosures are unlikely to cause damage, provided the box boards fulfill the other criteria listed above. The most widely accepted plastic material for use as enclosures in conservation is inert polyester film e.g. Melinex® or Mylar®. Any plastic used should be free of plasticiser, and the surface should not be glazed or coated. Polyvinyl chloride (PVC) should not be used. Enclosures are available in a variety of designs and many suppliers provide custom-made enclosures.

8 Many manufacturers test their products using the Photographic Activity Test (PAT) and advertise storage materials which pass the PAT (*ISO 18916:2007 Imaging materials. Processed imaging materials. Photographic activity test for enclosure materials*). Developed by the American National Standards Institute (ANSI), the test determines whether or not a storage material will cause fading or staining in photographs.
In addition, there is another more comprehensive standard BS *ISO 18902:2013 Imaging materials. Processed imaging materials*. Albums, framing and storage materials which specifies the principal physical and chemical requirements for album, storage and framing materials to prevent damage to processed or printed imaging materials over time. Materials that are described as photo-safe should meet the requirements of the *International Standard ISO 18902:2013*. Material which is PAT tested alone is not necessarily photo-safe.

Different types of photographs should be stored separately to avoid physical and chemical damage.

- Photographs with glass supports can be housed in four flap paper enclosures stored vertically in boxes or in custom-made cabinets.
- Plastic black and white negatives and all film transparencies (slides) can be housed in polyester sleeves stored in photographic storage boxes or in a hanging file system in metal cabinets. They can also be kept in purpose-made packaging in cold storage.
- Most black and white and colour prints can be housed in polyester sleeves using photographic conservation paper or museum board as a support if necessary. Sleeves should not be completely sealed; they should then be placed in photographic storage boxes or files. Prints with delicate surfaces, such as flaking emulsion or lifting pigments should be stored in paper enclosures.
- Photograph albums were often made of poor quality materials leading to damage to the photographs. Albums also frequently have raised decoration on the bindings which is easily abraded. These should be stored in made-to-measure drop-front boxes.

Polyvinyl chloride plastics, glassine envelopes, mechanical wood pulp papers and old photographic suppliers' boxes (although they may be of some interest in themselves) are all unsuitable for photographic storage. If they are of historic interest they should be stored separately from the photographs. Metal storage furniture is preferable to wooden storage furniture. The metal should have a baked enamel or powder-coated finish. Plastazote®, an inert polyethylene foam can be used to line shelves or drawers in order to soften hard surfaces. While old wood may be safe, new wood must be avoided, especially if it has been bleached or freshly painted because it gives off harmful gases. Fragile material such as glass plate negatives should not be stored on mobile shelving.

Conservation

Some types of deterioration and damage can be treated more satisfactorily than others. Cleaning and structural repairs are the most common conservation treatments. It is also common to remove materials that are causing damage or could cause damage to photographs e.g. discoloured brittle paper negative enclosures, and if necessary, replace them with appropriate materials. Appropriate materials can also be used as barriers e.g. as inserts in a bound volume, manuscript or album which is made of poor quality paper or when packing, mounting or framing a photograph. This can make a considerable difference to the life of the photograph. Mould damaged areas of a photograph can sometimes be treated to prevent further deterioration but reconstruction of a mouldy image is usually not possible. It is not possible to reverse fading and tarnishing in the original photograph without the risk of further damage. Conservation is often accompanied by recommendations for improvements in the storage environment, and for the safe use of the photographs.

Photographs are complex objects that are easily damaged. Cleaning, consolidation[9], repair and flattening of photographs should only be carried out by an accredited photographic conservator[10]. Certain procedures such as some minor cleaning and re-housing can be undertaken after training by a conservator.

Digitisation

Digitisation of historical photographs has become widespread. It is a useful means of making photographs accessible and in many cases reducing handling of the original. However, it needs to be carried out with considerable planning to ensure that the historic photographs are not damaged by environmental changes or handling during the process. The technology used needs to be the most appropriate. Digitisation can only ever represent part of the information contained in the original photographic object and should not be considered a permanent cheap alternative to the care of the originals. It is almost certain that the originals, stored and used sympathetically will last for longer than the digital technology needed to view the images.

9 Consolidation in this context is the reattachment of flaking or detaching emulsion.
10 A conservator accredited by Icon, the Institute of Conservation or the Archives and Records Association.

Online Resources

Graphics Atlas
graphicsatlas.org

FilmCare
filmcare.org

Image Permanence Institute publications:
imagepermanenceinstitute.org/education/publications.html

Adelstein, P Z, IPI Media Storage Quick Reference, Rochester: Image Permanence Institute, 2009

Reilly, J M, IPI Storage Guide for Acetate Film, Rochester: Image Permanence Institute, 1993

Reilly, J M, Storage Guide for Color Photographic Materials, New York: The University of the State of New York, 1998

Valverde, M F Photographic Negatives: Nature and Evolution of Processes, Rochester: Image Permanence Institute, 2004

Additional Reading

Baldwin, G and Jurgens M, Looking at photographs: a guide to technical terms, Los Angeles: Getty Publications, 2009

Ball, S et al, The care of photographic materials and related media: guidelines on the care, handling, storage and display of photography, film, magnetic and digital media, London: Museums and Galleries Commission, 1998

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