



**AUDIOVISUAL PRESERVATION
SURVEY AND ASSESSMENT REPORT**

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SUMMARY

This Archives Society of Alberta (ASA) audiovisual survey and assessment was carried out across the forty-four ASA Institutional Member archives, to determine the types and formats of audiovisual material, their extent and condition, the resources and needs available for their care, and provide recommendations for their preservation. The project concludes, that the central strengths and weaknesses through the archives surveyed revolves around knowledge of AV analogue technical aspects, such as format and deterioration identification; best practices in AV housing, storage methods and climate; and the technical planning and management of these holdings for digitization to preservation and access file surrogates. A small percentage of archives have comprehensive knowledge and technical expertise in all these aspects. In addition, they have in-house digitization capabilities to reformat AV to preservation, as well as access targets, and for a selection of AV media. They are a strong resource in the archive community. By contrast, the remaining majority of archives are struggling with a serious lack of this specialized knowledge, that is not only compromising their intellectual control in terms of the care of their AV holdings (from identifying those at risk, to housing and storage practices), but also slowing the increasingly urgent planning and decision-making regarding the digital preservation of their AV. This lack of intellectual control is further challenged by the increasing lack of analogue AV playback equipment – the obsolescence of this equipment.

Summary of Recommendations

Training

1. Workshops: Address the lack of knowledge and skill in AV analogue care and digitization planning through province-wide workshops.
2. Consultant: Appoint an AV digital media preservation specialist to provide consultation to the archives in the planning and implementation of the digitization of their analogue AV holdings.

Research

1. Legacy equipment: Continue a more extensive research and outreach in the province to identify technicians who have the expertise to assess, repair, retrofit if necessary, and use existing legacy equipment.
2. Digitization facilities and independents in the province: Identify and vet with respect to archival best practices, and adherence to international standards in the creation of digital surrogates
3. Climate controlled centralized storage options research.

Intellectual control and best practices care

1. Inventories: Inventory of the AV holdings in archives to a level that includes condition reports with identification of formats, types of deterioration and levels, real time running time, recording speeds and tape brand names, for example.
2. Housing and storage methods best practices: Implementation across all archives.

Long-term

Develop a strategy to co-ordinate the existing knowledge and skill resources and expertise in analogue and digital AV in the province. With strong expertise and well-maintained equipment in select archives, there is a potential to explore the possibility of identifying specific archives as centres of analogue and digitization expertise and technology.

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1 INTRODUCTION

The DHCP (Documentary Heritage Communities Program) Alberta Audiovisual Preservation and Access Policy project was a thirteen and one half month project, begun in February 2016 and completed March 31st, 2017. Its culmination is this province-wide audiovisual preservation report for the Archives Society of Alberta (ASA). The report is based on the on-site survey and assessments conducted at ASA's forty-four institutional member archives, and details the types and formats of the AV holdings, their number, condition, risk level and level of priority for action. The report concludes with the short-term and long-term needs of ASA member archives as a result of the survey and assessments, and, based on these needs, provides short and long-term recommendations for improving the AV preservation of, and access to these holdings.

The project arose in part, out of a growing number of inquiries the ASA received from archival repositories in Alberta, regarding the identification and care of analogue AV media. Gradually, the kind of AV material, its extent, condition and the knowledge and skill level available for caring for it, began to be raised. Based on these questions, a project took shape to respond to those questions by providing a direction for the care, preservation and management of these holdings. The project sought to determine needs and strengths in their care and condition in order to establish ways in which those long and short terms needs could be met.

The AV preservation survey and assessment focused on analogue moving image and sound media exclusively. The total of this media is estimated at 121,314 items, across forty-four archives. These holdings range from the largest holding of 38,132 AV items to the smallest of 11 AV items, and comprise 39 formats within the motion picture film, audio and video media types, and an estimated breakdown of 10,824 reels of motion picture film, 3,060 reels of microfilm, 78,176 audio items, 28,856 video items, and 398 filmstrips.

Knowledge to identify formats and deterioration types and levels, is critical in establishing intellectual control over the media in terms of determining risk to the media. Access to AV through playback equipment is another critical component in determining the archival value of the machine-readable media of open tape and cassette audio and video formats, as well as phonograph discs, and wire recordings, among others. This access becomes particularly important if donor paperwork accompanying the media is incorrect, incomplete or non-existent. Best practices for housing, storage methods and climate are another important factor in the care and conservation of AV. This project assesses these aspects of archival stewardship in the ASA institutional archives.

In terms of preservation, risk of content through carrier loss either through deterioration of the media and/or the unavailability of playback equipment, is a clear and present danger within these media formats. This project focuses on those media at the highest risk: Those which are currently showing serious signs of chemical deterioration, are inherently at high risk for this deterioration, and those at risk due to obsolescence of equipment that is no longer available. The assessments carried out during this survey were based purely on visual inspection. No playback of any of the AV material was done.

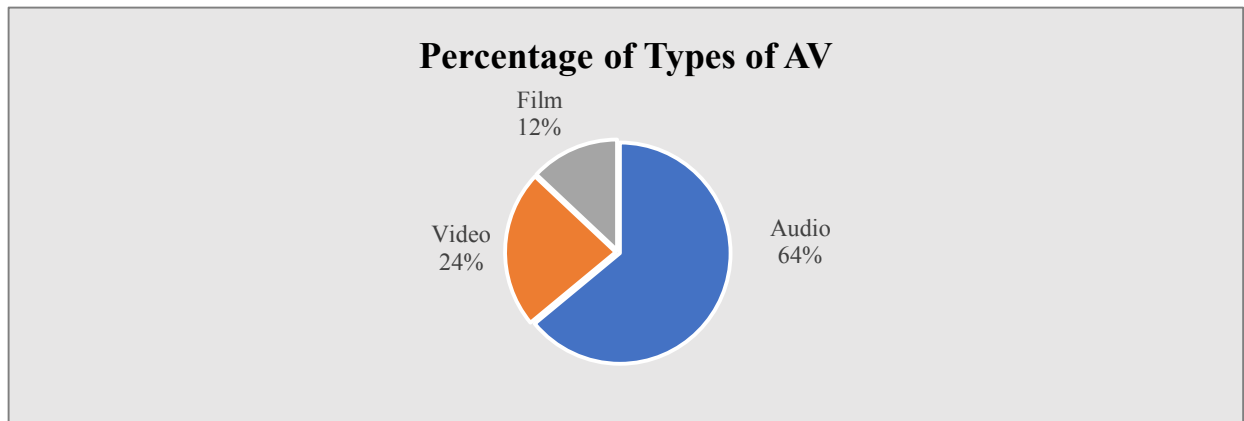
2 INSTITUTIONAL MEMBER ARCHIVES OVERVIEW

All archives but one have audio holdings. All archives but two have video holdings. All archives but eight have film holdings.

2.1 Types and Quantity of AV in Member Archives

The total amount of AV items across the forty-four archives is closely estimated at 121,314 items. This total is comprised of 78,176 audio items, 28,856 video, and 14,282 motion picture, filmstrip and microfilm items. Microfilm alone accounts for 3,060 items.

Figure 1: Percentage of AV Types



The film portion of **Figure 1** includes microfilm and filmstrips.

Table 1: Archives and AV Types

AV Type	Item Count	# of Archives
Audio	78,176	43
Video	28,856	42
Film	10,824	36
Microfilm	3,060	23
Filmstrips	398	8

Table 2 below, provides the total estimated AV item count and the AV type for each archive.

Table 2: AV Types in Individual Archives

ASA Institutional Archive	Audiovisual Types	Estimated AV Count
Alberta Health Services Archives	Film, Audio, Video	278
Alice B. Donahue Library and Archives, City of Athabasca	Film, Microfilm, Filmstrips, Audio, Video	278
Ambrose University College	Film, Audio, Video	1,314
Archives and Special Collections, University of Calgary	Film, Audio, Video	20,000
Banff Centre, Paul D. Fleck Library and Archives	Film, Audio, Video	6,118
Blackfalds and Area Historical Society	Video	13
Bohdan Medwidsky Kule Folkore Ukrainian Archives	Film, Microfilm, Audio, Video	12,349
Canmore Museum and Geoscience Centre	Film, Microfilm, Audio, Video	202
City of Calgary, Corporate Records, Archives	Film, Audio, Video	1,486
City of Edmonton Archives	Film, Microfilm, Filmstrips, Audio, Video	3,275
City of Wetaskiwin Archives	Film, Microfilm, Audio, Video	167
College of Registered Nurses	Audio	74
Esplanade Archives	Film, Microfilm, Audio, Video	2,114
Fort McMurray Historical Society	Film, Audio, Video	265
Glenbow Archives	Film, Microfilm, Filmstrips, Audio, Video	8,916
Hinton Municipal Library and Archives	Microfilm, Audio, Video	90
Jasper Yellowhead Museum and Archives	Film, Microfilm, Audio, Video	810
Jewish Archives and Historical Society of Edmonton and Northern Alberta	Film, Microfilm, Audio, Video	1,293
Legal Archives Society of Alberta	Microfilm, Audio, Video	1,076
Lesser Slave Lake Indian Regional Council	Audio, Video	763
Loyal Edmonton Regiment Military Museum	Film, Filmstrips, Audio, Video	283
Mennonite Historical Society of Alberta	Microfilm, Audio, Video	154
Millet and District Museum and Archives	Microfilm, Audio, Video	67
Milo Library and Archives	Audio, Video	11
Musée Heritage Museum	Film, Microfilm, Audio, Video	548
Museum of the Highwood	Audio	30
Okotoks Museum and Archives	Film, Microfilm, Filmstrips, Audio, Video	196
Peace River Museum, Archives and MacKenzie Centre	Film, Microfilm, Audio, Video	433
Pincher Creek and District Historical Society	Film, Audio, Video	152

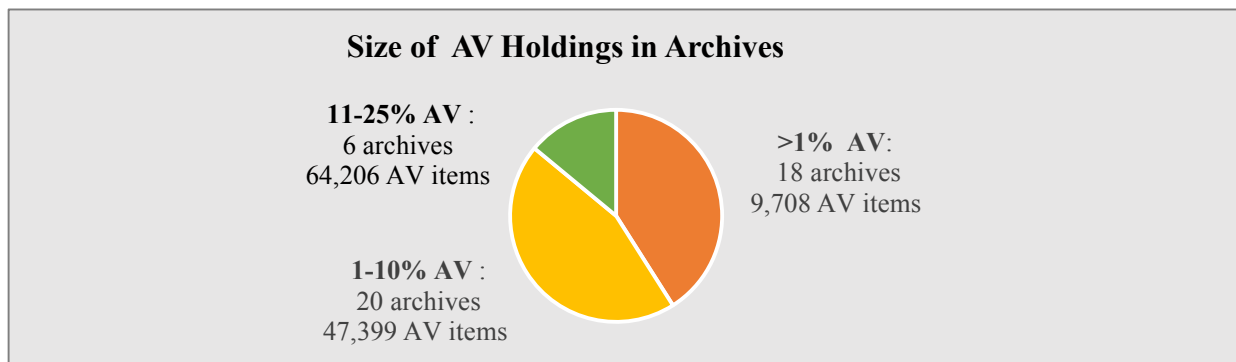
Table 2: AV Types in Individual Archives *cont'd*

ASA Institutional Archive	Audiovisual Types	Estimated AV Count
PPCLI Museum and Archives	Film, Microfilm, Filmstrips, Audio, Video	542
Provincial Archives of Alberta	Film, Audio, Video	38,132
Red Deer and District Archives	Film, Microfilm, Filmstrips, Audio, Video	2,330
SAIT Polytechnic	Film, Audio, Video	256
Sir Alexander Galt Museum and Archives	Film, Filmstrips, Audio, Video	1,643
South Peace Regional Archives	Film, Microfilm, Audio, Video	674
Strathcona County Museum and Archives	Film, Microfilm, Audio, Video	451
Sylvan Lake and District Archives	Film, Audio, Video	11
Thomas A. Edge Archives and Special Collections, Athabasca University	Film, Audio, Video	2,644
United Church of Canada Archives	Film, Microfilm, Filmstrips, Audio, Video,	626
University of Alberta Archives	Film, Audio, Video	5,000
University of Lethbridge Archives	Film, Microfilm, Audio, Video	3,310
Whyte Museum of the Canadian Rockies	Film, Audio, Video	2,130
Youthlink Calgary – The Calgary Police Interpretive Centre	Film, Microfilm, Audio, Video	573
TOTAL		121,314

2.2 Size of AV Holdings

The largest AV holdings are held by the fewest number of archives (14%) archives.

The remaining 85% of the archives are almost evenly divided between less than 1% AV, and 1% to 10% AV.

Figure 2: Size of AV Holdings in Archives in Relation to Entire Collection

Summary

1. Audio media items present the largest type, in terms of number, of AV across the members' archives.
2. The largest AV holdings relative to the rest of their collection, is estimated at 45%. The smallest AV holdings is estimated at less than 1% of their entire collection.

3 PRESERVATION RISK AND FORMATS

3.1 Preservation Risks

The AV in members' archives was assessed for high risk for content loss due to physical condition and format equipment obsolescence. The three categories of risk used in this assessment were largely drawn from recent AV surveys, analyses and standards.¹ The categories are serious deterioration present in media upon observation, inherent risk of serious deterioration, and obsolescence of playback equipment.

Serious deterioration is characterized by:

- a. Acetate base deterioration in the form of what is commonly referred to as “vinegar syndrome”;
- b. Deterioration of the organic dyes in motion picture film in the form of colour fading;
- c. Magnetic tape binder hydrolysis exemplified in two aspects of soft binder syndrome (SBS): Sticky Shed Syndrome (SSS) found in polyester tape with back-coating, and Soft Binder Syndrome –Unidentified Properties (SBS-UP), found in polyester tape with no back-coating.²

Table 3: Sticky Binder Syndrome (SBS) and Sticky Shed Syndrome (SSS)

Syndrome	Tape base and properties	Symptoms of Deterioration
SBS-SSS	Polyester, back-coating	Sticking, significant shedding, squealing Respond to baking
SBS-UP	Polyester, no back-coating	Sticking, squealing, little or no oxide shedding Mostly identified through playback. Identify primarily through tape brands. Do not respond to baking

- d. Loss of plasticizer in lacquer phonograph discs, and plasticizer exudation.

(See additional information on these types of deterioration in Appendix A.)

A variety of factors drive the deterioration and affect the stability of motion picture film and magnetic media, and make it difficult to predict the progression (or not) of deterioration for a given media format. Central factors, such as climate, housing, storage methods and handling are addressed in Section 5 below.

Playback obsolescence refers to the unavailability of playback machines, technical expertise to repair legacy equipment, lack of analogue test equipment, and/or parts, and tools required to repair equipment. This report focuses on equipment that presents a high risk for obsolescence.

In this survey, the characteristics and preservation issues around risk are limited to those that present the highest level of risk. Additional risks to media such as tape thickness, track configuration age, brands, and wind integrity were observed during the survey, but not used as a benchmark for high risk. Fungus is an important risk factor in legacy AV, but no fungus was found in the sampling carried out in this project.

3.2 AV Types and Risk Levels in Member Archives

40% of the combined AV holdings sampled are at the highest risk level.

This represents 23% of the total combined AV holdings across all archives surveyed.

The largest number of high risk items is audio, followed by video then motion picture.

Figure 3: Percentage of AV Types at High Risk

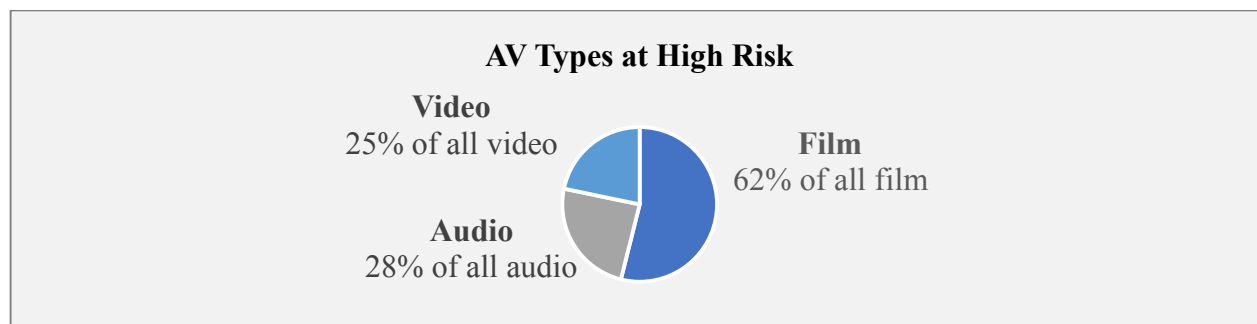


Table 4: Number of AV Types at High Risk

Media type	Total # of discreet items	Total # items at High Risk Deterioration, Inherent risk, Obsolescence
Motion Picture Film (includes filmstrips, microfilm)	14,282	8,871 (2,946 Deterioration, 5,925 inherent)
Audio	35,499	10,047 (916 Deterioration, 6,911 Inherent and Obsolescence, 2,363 Obsolescence only)
Video	19,671	5,012 (35 Deterioration, 4045 Inherent and Obsolete, 952 Obsolescence only)
Total	69,452	23,930

Audio and video of three archives were not included in **Figure 3** and **Table 4** above, as the breakdown into audio and video formats, from which high inherent risks and high risks of obsolescence could be determined, was not possible at this time. This exclusion represents approximately 57,318 items.

The total estimated number of items across all media formats, exhibiting serious deterioration present in the sampling was 3,897. This is based on the sampling carried out during the site visits, as well as estimates provided by the archives from their own observations, where possible. The average sampling rate was 12%. Sampling rates and methods are detailed in Appendix F.

The breakdown of media formats within the type of media are a combination of close estimates from inventories provided by the archive, and my guesstimates for three archives (representing 11,873 items).

3.3 AV Format and Risk Levels in Member Archives

Table 5 below summarizes the AV formats held in member archives, their risk and subsequent priority level.

Table 5: AV Formats and Risk

All Formats in Membership	#Archives Holding Format	# Total Items	# items at Risk	Highest Risks -D (deterioration) -I (inherent risk deterioration) -O (obsolescence)	Priority
Motion Picture	35	10,824	8,462	D, I	High
Filmstrips	8	398	398	D, I	High
Microfilm	22	3,060	11	D	Med
¼" open audio	31	5,876	5,876	D,I,O	High
½" open audio	3	535	535	D, I, O	High
1" open audio	1	35	35	D, I, O	High
2" open audio	1	403	403	D, I, O	High
Compact cassette	41	21,233	154	D	Med/High
Cartridge	1	8			High
Mini cassette	3	17			Med
8 track	5	50			Low
Micro cassette	12	313	3	D	Med
Wire	1	3	3	O	High
Cylinder	5	62	62	I, O	High
Aluminum disc*	1	130			High
Lacquer disc	11	609	609	D, I	High
Shellac disc	10	199	199	D, O	High
Vinyl disc	22	3,053	2	D	Low
Steel disc	1	5	5	D	Med
DAT	11	2,161	2,161	O	High
ADAT	1	691			
AIT	1	44			
8mm Exabyte	1	32			
½" open video	8	153	153	D, I, O	High
1" open video	11	687	687	D, I, O	High
2" open video	5	68	68	D, I, O	High
¾" U-Matic	26	3,137	3,137	I, O	High
VHS /S-VHS	41	10,757	3	D	Med
Betamax	15	361	361	O	High
Betacam/BetcamSP	23	2,075			Low
Digital Betacam	6	54			Low
Video 8/Hi8	17	591	591	O	High
D2, D3	2	10			Med
DLT	1	4			Low
DD8	1	1			Low
DVCAM	5	120			Low
DVCPRO	2	8			Low
Helical Scan	5	12	12	O	High
MiniDV	13	1,673			Med High
Total		69,452	23,930		

* The 130 aluminum have been reformatted to preservation and access digital surrogates.

3.3.1 Motion Picture Film, Microfilm and Filmstrips

The total number of motion picture, microfilm and filmstrip high risk material is 14,282. Overall, the sampling of these media, found few instances of motion picture film deterioration through acetate base deterioration (“vinegar syndrome”), widespread instances of colour deterioration (acetate and polyester), very few instances of silver mirroring in microfilm holdings, and widespread instances of colour fading in filmstrip collections.

One archive has an estimated 20% of their motion picture acetate items suffering from various levels of acetate base deterioration. This estimate was based on two site visits with sampling that included Image Permanence Institute (IPI) acid-detection strip tests.³

Table 6: Motion Picture Film, Microfilm and Filmstrip Risk Levels

Types	#Archives Holding Format	Total Items	Total High Risk items	Deterioration Present	Inherent Risk	High Risk Obsolescence	Priority
Motion Picture	35	10,824	8,462	2,165	4,707		High
Microfilm	22	3,060	11	11			Med
Filmstrips	8	398	398	5	398		High
Total		14,282	8,871	2,181	5,105		

Acetate film is vulnerable to base deterioration in the form of “vinegar syndrome”. A second type of deterioration occurs in colour film, due to the unstable organic compounds of colour dyes, and results in “dark fading” (colour fading). In the case of colour film, high temperatures accelerate the deterioration of these dyes more than relative humidity. It has been noted that dye stability in Kodacolor film manufactured between 1942 and 1953 is poor. Kodak Eastmancolor negative and print film from 1950 to approximately 1960 also has very poor cyan and yellow dye stability, resulting in varying degrees of overall magenta colour.⁴

A large amount of the film sampled in members’ archives, consisted of the stocks mentioned above. In addition, an estimated 80% of the films in the archives are acetate base, as opposed to polyester base stocks, and therefore are at high inherent risk for serious base deterioration. The remaining polyester base film has a high inherent risk of colour fade, particularly due to the prevalent higher than recommended storage temperatures in member archives. (See additional information in Section 5.)

For approximately 90% of the ASA member’ archives, the acceptable recommended relative humidity and temperature are, as yet, an unmet challenge, and continue to be a significant driving force in the deterioration of their motion picture film, in particular. (See Section 5 below).

The inspection of AV holdings by media type for deterioration present was determined through sampling. For a number of archives, the sampling was combined with an estimate of additional items given by the archive. The deterioration of film included acetate base deterioration at levels of acidity between levels 1 (Fair to good – deterioration starting) to 2+ (poor – actively degrading) according to the acid-detection (A-D) strips that interpret levels of deterioration.

The percentage of deteriorated film included colour deterioration as well as vinegar syndrome in acetate base material sampled (200 items). It is also important to note that many of the archives have very small film holdings, so contrary to what the percentage suggests, the actual number of deteriorating film in those cases is small. Overall, this estimate of deteriorated AV media is conservative, considering the low-end sampling rate of 12%.

3.3.2 Audio Formats

The total number of high risk audio items is estimated at 10,042. The highest risk of these are cylinders, lacquer phonograph discs,⁵ DAT,⁶ and shellac phonograph discs,⁷ based on deterioration present in the sampling, format inherent deterioration and/or obsolescence. The largest number of formats with high risk are open reel, DAT and lacquer. The assessment discovered deterioration present in members' audio holdings was most evident in ¼" open tape, compact cassette and lacquer discs.

Table 7: Audio Formats and Risk Levels

All Formats	# Archives Holding Format	# Total Items	# High Risk discreet items	Deterioration Present	Inherent Risk	High Risk Obsolescence	Priority
¼" open audio	29	5,876	5,876	436	5,876	5,876	High
½" open audio	3	535	535	18	535		High
1" open audio	1	35	35	1			High
2" open audio	403	403	403	1	403		High
Compact cassette	41	21,233	154	154			Med/High
Micro cassette	12	313	3	3			Med
DAT	11	2,161	2,161			2,161	High
Wire	1	3	3	3		3	Med/high
Cylinder	5	62	62		62	62	Highest
Lacquer disc	11	609	609	280	609	609	Highest
Shellac disc	10	199	199	16		199	High
Vinyl disc	22	3,053	2	2			Low
Steel disc	1	5	5				Med
Total		34,482	10,042	914	7,485	8,945	

3.3.2.1 Open Reel Audio

The main components of magnetic tape consist of a base (substrate), binder and in some cases a back coating. In addition, lubricants, binding agents and plasticizers, whose chemical components are more often than not, not identified by the manufacturer, can be a part of the binder/magnetic particle layer. Each component is susceptible to deterioration in different ways and to different degrees, the most serious being base deterioration in the case of acetate base tapes, and sticky shed syndrome and soft binder syndrome – unidentified properties, in the binder component. (See additional information in Appendix A).

Open ½”, 1”, 2” tape

Unlike ¼” open tape which was manufactured in acetate as well as polyester bases, the ½”, 1” and 2” open tape audio formats were only manufactured with a polyester base. These formats are at high risk due to obsolescence of playback.⁸

3.3.2.2 Compact Cassettes

This audio format dates from 1964 in the US, and as in the case of all cassettes, was manufactured with a polyester base only. Although the format is not currently obsolete, its obsolescence is anticipated. IASA-TC 03 categorize it as “inherently unstable and ... should be copied”. However, in practice, compact cassettes have historically been seen to be quite stable chemically.⁹ For this reason, they were not rated as high risk in the present survey. They are ranked as high risk, however if SBS-UP deterioration is present.¹⁰

During the site assessments for this project, moderately severe, to severe level wind issues (characterized in spoking, step packs, frilling, popping strands and windowing) were evident in three archives. The total, of moderately high risk compact cassette items, is estimated at 40% of the combined compact cassette holdings of these three archives (an estimate of 500 of a total of 1,120 items). No deterioration was observed, but the compromised wind integrity would make these compact cassettes a concern and medium high priority for reformatting, depending on their archival significance.

Table 8: Compact Cassette Type and Risk Level

Type	Risk
Type I (ferric oxide magnetic material)	Low risk
Type II (chromium dioxide magnetic material)	Medium risk: Instability of binder
Type III (ferric oxide and chromium dioxide magnetic material)	Medium risk Obsolescence
Type IV – metal particle tapes	Medium risk - oxidation or corrosion of particles, (particularly those late 1980’s early 1990’s)

3.3.2.3 DAT

There are an estimated 2,161 DAT tapes across the member archives. The format was introduced in 1987 as the first digital audio tape and playback, both for audio as well as storage (Digital Data Storage) uses.

Though DAT tapes do not suffer from a high risk of deterioration, and so high inherent risk of deterioration, they do warrant ranking as high risk due to obsolescence. The combination of fewer machines than for other formats, initially manufactured, and no new machines made since 2005, contributes to the scarcity of this equipment. In addition, the machines were heavily used in their professional environments, resulting in a significant amount of wear on the heads on existing machines, and making parts in high demand. DAT machines are also more complex to service than other audio playback equipment, and repair technicians who were few to begin with, are becoming fewer. A second challenge to the reformatting of DAT tapes, is mechanical alignment: A tape will play well on one machine but not at all on another.¹¹

3.3.2.4 Cylinder Discs

Cylinders were invented in 1877 by Thomas Edison, and marketed through the 1920s, in the form of wax, and later celluloid. Wax cylinders are susceptible to serious degradation once thought to be fungal but more recently believed to be chemical deterioration.¹² Celluloid type cylinders suffer from shrinkage and cracking if the core is made of a different material.

Cylinders are ranked high risk due to their high inherent risk of deterioration and playback obsolescence.¹³

3.3.2.5 Lacquer Phonograph Discs

Lacquer phonograph discs date from the late 1920s, and may be composed of lacquer over steel, glass, aluminum or paper. They are considered high risk due to their high inherent risk of deterioration which becomes evident in plasticizer exudation, the deterioration of the cellulose nitrate coating, and subsequent delamination. Delamination is unpredictable and often results in sudden and thorough loss of the coating and so complete loss of information.¹⁴

3.4.2.6 Shellac Phonograph Discs

Shellac phonograph discs date from 1897 through the late 1950s, and are composed of a mixture of mineral powders bonded together by binders, originally containing shellac resin. They are considered stable but fragile, as they are very brittle and can break if dropped. During this survey a significant number were observed broken. They are ranked high risk due to high playback obsolescence related to their coarse groove.¹⁵

3.3.3 Video Formats

Video was introduced in 1956 and consists of the same properties of base, binder and magnetic particles as audio open tape. However, it was manufactured in a polyester base only, and so is not susceptible to acetate base deterioration, exemplified by “vinegar syndrome”. Most video formats that are high risk, are so ranked, due primarily to obsolescence of playback machines, availability of tools, parts and repair expertise.

The highest levels of obsolescence rankings for video that this survey used in the assessment from a 2002 guide, are:

“Critically endangered. - There is a small population of aging playback machinery, with no or little engineering or manufacturing support. Anecdotal evidence indicates that there are fewer working machine-hours than total population of tapes. Tapes may range in age from 40 years to 10 years.”

“Extinct - Only one or two playback machines may exist at specialist laboratories. The tape itself is more than 20 years old”.¹⁶

The ½” and 2” formats are also high risk in terms of inherent risk for serious deterioration.¹⁷ (See additional information in Appendix A.)

Table 9: Video Formats and Risk Levels

All Formats	#Archives Holding Format	# Total Items	# High Risk items	Deterioration Present	Inherent Risk	High Risk Obsolescence	Priority
½” open video	8	153	153	18	153	153	High
1” open video	11	687	687	14		687	High
2” open video	5	68	68		68	68	High
Helical scan	5	12	12			12	
¾” U-Matic	26	3,137	3,137		3,137	3,137	High
VHS / S-VHS	41	10,757	3	3			Med
Betamax	15	361	361			361	High
Video 8/ Hi8	17	591	591			591	High
Total		15,754	5,012	35	3,358	4,270	

3.3.3.1 Open Reel Video

The three formats of open video are ½”, 1”, 2” and all are polyester base and all are ranked high risk.

a. **Open ½”**

This format dates from 1965 to the late 1970s and is found in the industrial, educational and consumer markets. It was manufactured in two versions, CV and AV that require different playback decks.¹⁸ As well, interoperability issues are common between machines, compounding the challenges of good quality playback. Historically, it suffers from binder failure to a greater degree than other open video formats. The format is ranked as high risk due to its high inherent risk of deterioration and obsolescence as playback is very difficult to find.

b. **Open 1"**

Three types of this format were manufactured: Type A, Type IVC, Type B.

Table 10: Open 1" Video Tape Use, Risk Level

Type	Use	Risk Level
Type A	Introduced mid 1960's; educational / industry sectors	High
Type IVC	Introduced in early 1970's;	High
Type B	Introduced mid 1970's; primarily Europe	High

This format suffers from binder deterioration, but to a lesser degree than audio open tape or video ½" or 2" open tape. All three types are ranked at high risk due to playback obsolescence.¹⁹

c. **Open 2" Type C (Quadruplex or "Quad")**

This format was introduced in the US in the 1956 and used through the early 1980's, primarily in the professional sector for in-studio production.²⁰ This format is ranked high risk due to high inherent risk of deterioration and high obsolescence. Parts and repair expertise are particularly scarce.²¹

3.3.3.2 Video Cassette

a. **U-Matic / U-MaticSP**

This ¾ inch tape in a cassette was introduced in 1971 and remained in use until 2000. U-Matic was manufactured in (low band) which was used primarily in the educational sector, and in U-MaticSP (high band), used in the professional broadcast field. Their manufacture was discontinued in 1990, and replaced by Betacam.²²

Surveys have found that 1970's and 1980's tapes suffer from signal loss due to deterioration, presenting an additional high risk factor of the format.²³

However, since this survey and assessment did not include playback of any of the AV materials, loss of signal could not be assessed. This format is ranked high risk due inherent risk of deterioration and high playback obsolescence.

b. **Betamax**

This ½" cassette format was actively used from 1975 to the late 1980s. Playback equipment ended in 2002. is ranked high risk due to playback obsolescence and interoperability issues.

c. **Video8/Hi8**

From the beginning of its manufacture in the mid 1980s, the optical quality of Hi8 has been problematic, plagued with significant dropout.²⁴

These formats are ranked high risk due to equipment obsolescence, and repair complexity and expense.

Summary

1. The predominant type of media at high risk is motion picture film (excluding microfilm) in terms of serious deterioration present and inherent risk of serious deterioration. 80% of these holdings are held by four archives, a total of 8,814 items, and accounting for 62% of the total film at risk. The deterioration includes acetate base deterioration in the form of “vinegar syndrome” in levels 1 to 3. In approximately 40% of the remaining film holdings, 200 items were identified in the sampling as having deterioration levels between 1 and 2 (ranging from starting to degrade, to items actively degrading). It is recommended that film with an acid-detection strip reading of more than 2, be frozen.

2. Audio holdings present the second highest risk in terms number of items actively deteriorating, inherently at high risk of deterioration, as well as for high risk for playback obsolescence. The following table is a guide, to the priority ranking within the category of high risk for audio:

Table 11: Summary of Audio High Risk Formats

Format	Risk
Lacquer phonograph discs	High inherent risk of deterioration resulting in delamination that can occur unpredictably and rapidly
DAT	High playback obsolescence, due to lack of availability of equipment and parts (in particular heads) and challenges with interoperability
¼” open tape	High inherent risk of deterioration and high level of playback obsolescence
Shellac phonograph discs	High level of playback obsolescence due to the course groove property of the discs.

3. Video accounts for 25% of the audiovisual media at high risk in the members’ archives. The following table is a guide, to the priority ranking within the category of high risk for video:

Table 12: Summary Video High Risk Formats

Format	Risk
½” open video tape	High risk due to inherent risk and obsolescence - playback is difficult to find.
2” open video tape	High risk due to inherent risk and high obsolescence risk machines, parts and repair expertise
¾” U-Matic and U-MaticSP video cassette	High Risk due to playback obsolescence and reported deterioration, though not found in this assessment.
Video 8 and Hi8 cassette	High risk due to equipment obsolescence
1” open video tape	High risk due to obsolescence, primarily. Inherent risk for deterioration is secondary.
Betamax video cassette	High risk due to playback obsolescence

This technical ranking of preservation risk is only one component in evaluating the priority of an item for reformatting to preservation and access file format surrogates. Archival significance plays a second, equally important, role in this decision-making process. If the media format and the archival value are both very high, then the priority to reformat the item is deemed very high.

4 ARCHIVAL SIGNIFICANCE

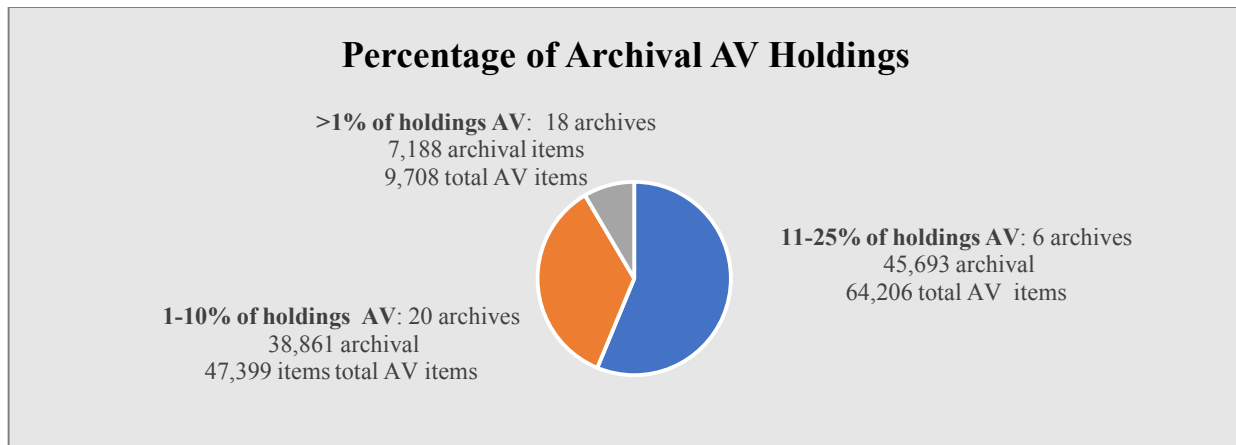
The definition of archival that is used in this report is *content that is unique and held only in the given organization*. Other categories of materials in archives such as rare (items that may additionally be held in a small number of other organizations) and commercial (mass produced items), were not distinguished in this survey. My understanding, however, during the survey is that a number of archives did not distinguish between unique and rare AV items when estimating the amount of AV that is archival in their holdings, so that the total number of archival items across the membership may, in fact, include rare media.

4.1 Archival Value

74% (91,742 items) of the total institutional members' AV holdings are estimated as archival. The estimates of the archival percentage for each archive were provided by the archive for twenty-five of the forty-four archives. Responses were not received from the remaining nineteen archives in time to be included in this report, so estimates were based on observations and conversations during the site visits.

The following is a breakdown of where the archival holdings fall relative to the size of the AV holdings.

Figure 4: Percentage of Archival AV Holdings



It was not possible to estimate the number or percent for each media format because the intellectual control in many cases did not identify the item to a level where its value could be determined.

The majority of AV is held by six archives with (5,000 + AV items), with a combined total of 84,397 AV items, and representing 70% of all member AV holdings. Of these 84,397 items, 72% are archival.

4.2 Intellectual Control

An assessment of the intellectual control the archives has over their AV holdings was carried out using a) Fonds level description level and b) Series, Files lists and lower level description (or any other detailed level of description such as Excel spreadsheets) as benchmarks. An estimated 77%

of the AV holdings are described at a Fonds level, and an estimated 42% are described at a Series or lower level.

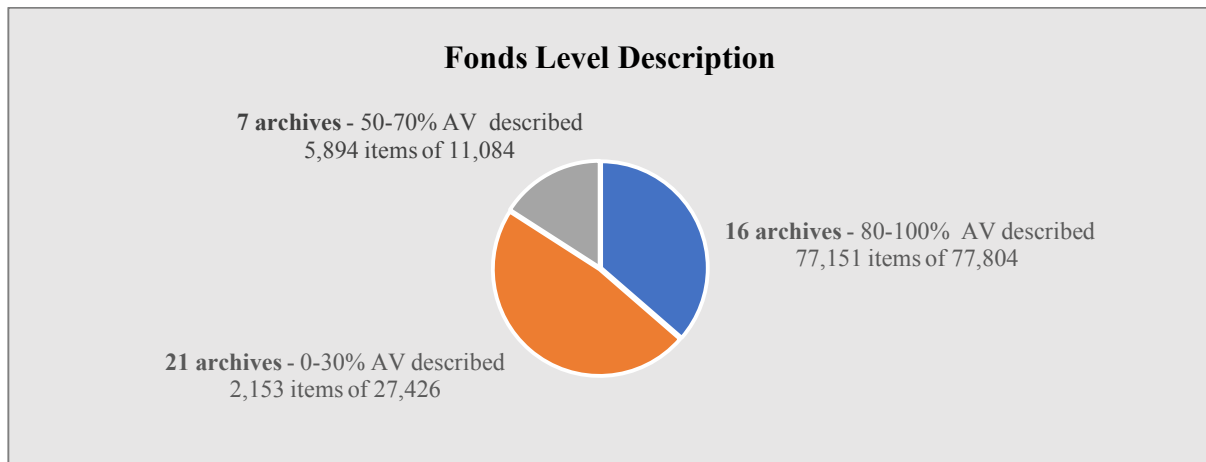
On the surface, these percentages suggest fairly good intellectual control of the AV holdings generally across the archives. However, upon a closer look, the estimated levels of intellectual control are somewhat misleading, first and foremost because the level of detail more often than not, does not include technical aspects such as the type and/or format. Most of the archives indicated that the descriptions were very minimal (for example “1 film”, or “1 audiovisual item”), and/or frequently not distinguishing the media type, or format. This did seem to be the case in many of the inventories received from the archives during this survey. In addition to this lack of detail, is the frequent, incorrect information in past descriptions of the AV media. And compounding the challenges of lack of detail, and/or incorrect information, is the pervasive situation archives are confronted with, that of the daunting task of parsing several different layers of previous, recent and current migrations of databases and record keeping documentation (including paper records) to arrive at the identification of formats and their current count. This continues to be another challenge in gaining intellectual control over the AV holdings.

The fact that all audio and video legacy media is machine-readable only (as opposed to motion picture film which is human readable), presents yet another stumbling block to identifying and appraising the media content, as obsolescence of playback equipment becomes increasingly unavailable.

4.2.1 Fonds Level Description

77% of AV is described to varying detail, at the Fonds level description, for a total of 82,220 AV items out of a total of 121,314 items.

Figure 5: AV Fonds Level Description



Of the forty-four archives, one archive is not able, at the time of the writing of this report, to practically determine what percentage of their AV is described at the Fonds level. (5,000 items)

Eight archives have 100% of their audiovisual described at the Fonds level (64,152 items)

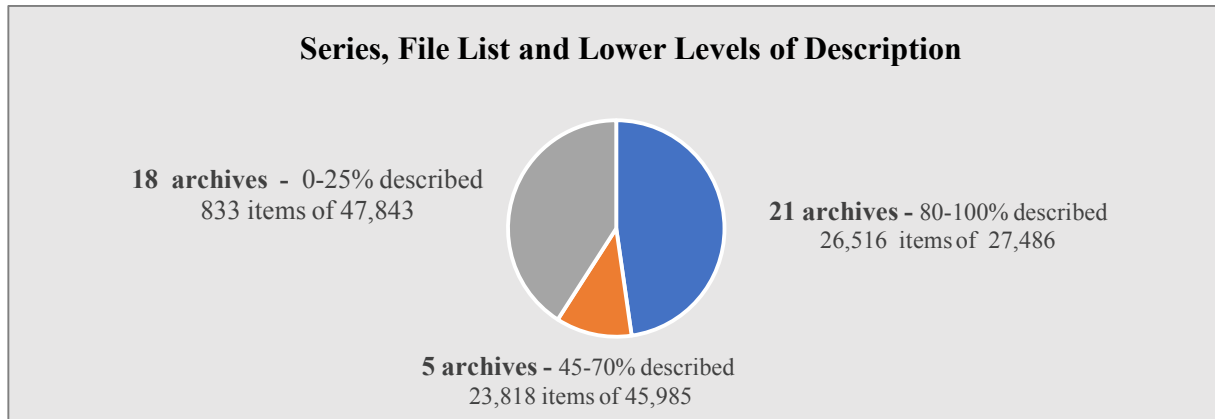
Eleven archives have none of their audiovisual described at the Fonds level (4,750 items)

4.2.2 Series, File List and Lower Level Description

43% of all AV items are described at a series or file list level (49,357 items).

Archives indicated that the finding aid descriptions for their AV were a mixed range of minimal and moderate detail.

Figure 6: Series, File List and Lower Level Description



4.3 Demand for Access

Demand for access to AV in member archives has been very low overall. This is due in part because there is little, if any, web presence for the material so researchers and the public are not aware of the existence of the material. This is due, in large part, to the minimal previous and current descriptions of the AV media. A central, double-pronged challenge of this situation, has been and continues to be a lack of knowledge to identify AV formats, as well as the exacerbating situation of an increasingly pervasive lack of working playback equipment, that would enable archivists to determine the content and significance of this machine-readable only media.

Summary

1. An estimated 74% of all AV is archival.
2. An estimated 77% of all AV media is described at a Fonds level.
3. An estimate 43% of all AV media is described at a lower level, such as Series, or file list.
4. The percentage described at a Fonds and lower level is misleading as the descriptions in a majority of instances lack sufficient detail to identify the media type or format, or provide inaccurate format identification.
5. A significant and pervasive challenge to describing the content of the media is the obsolescence of playback equipment.
4. The demand for access to AV media for research purposes, is overall minimal to non-existent due to the lack of web presence for the media, and in turn arises from the challenges of detailed records and playback.

5 CONSERVATION IN MEMBER ARCHIVES

Central aspects of AV conservation are ensuring the media is stored in recommended temperature and relative humidity conditions, and according to storage best practices methods and housing. The survey assessed both the knowledge in conservation care as well as the level of implemented care observed on site visits. Best practices for climate and AV media housing and storage methods are detailed in Appendix B.

5.1 Knowledge and Skill in AV Care

The assessment of the knowledge and skill in best practices for AV care included handling, housing, and storage methods, identification of media types and formats, and of deterioration kinds and levels. This assessment was carried out through on-site conversations with archive assistants and/or archivists and/or archive managers.

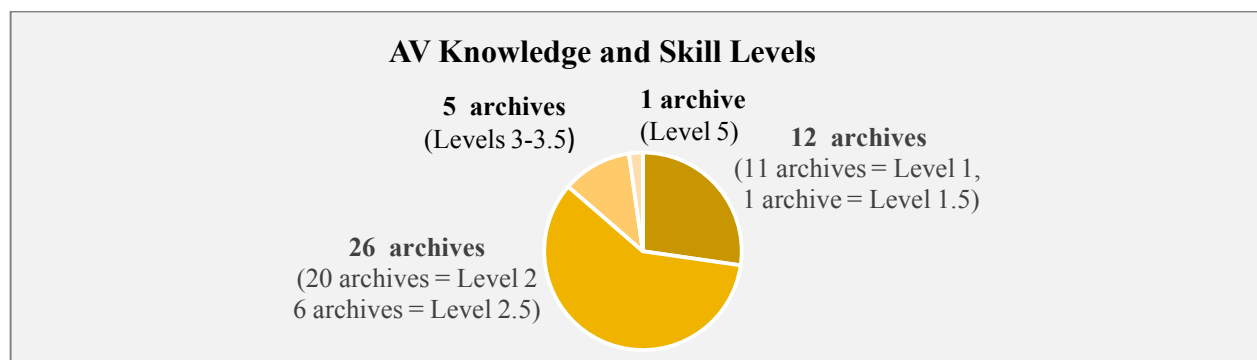
The method used for determining levels of knowledge and skill in each archive was to establish a template of meaningful benchmarks, that was used as a basis in the discussion with each archive during the site visit. In addition, a distinction was made between having knowledge, such as being able to identify a type of deterioration on observation, versus knowing where to go to acquire the knowledge (such as Google, or a knowledgeable colleague). Further, the assessment took into consideration the fact that many individuals with whom I did the site visits learned through our discussion, as well as through sitting in on all or part of the sample inspections. The majority of the archives were very clear about their need for more specialized knowledge for caring for these types of holdings, and expressed strong interest in attending AV workshops and learning about existing resources for their identification and care.

On average, the knowledge and skill level for identifying and caring for audiovisual material across the institutional member archives is low. Overall, there is minimal to some knowledge to identify some audiovisual media; no knowledge to identify types of deterioration or their levels, and no knowledge or minimal knowledge of best practices for handling, housing or storing. This assessment was not based on the state of housing or storage methods evident in their archive at the time of the site visit, since that situation was in some cases, due to constraints not related to knowledge and skill regarding best practices.

The purpose of assessing AV knowledge and skill level in the archives was to establish a general idea of where in the archive community there is expertise to draw on and where there is need for more information and support in order to carry out best practices care of AV material.

Based on this benchmark template, the average knowledge and skill level of the forty-four institutional members is 2.01.

As the breakdown by group in **Figure 7** below clarifies, 72% of the archives have an average knowledge and skill level of between 1 and 2; no knowledge to minimal and some knowledge of AV handling, housing and storage methods and climate.

Figure 7: AV Knowledge and Skill Levels Across Archives**Table 13: Knowledge and Skill Level Assessment Benchmarks**

Knowledge Level	Identification: Formats, Types, Deterioration	Best practices: Care: knowledge of housing, storage methods, climate control & monitoring
1 - No knowledge	Identify different media & deterioration	Handle, house or store
2 - Minimal to some knowledge	Identify some media, no knowledge to identify deterioration or levels	No knowledge or minimal of handling, housing or storing.
3 - Good knowledge base	Identify most media, some knowledge to identify deterioration or levels	Fair to good knowledge of handling, housing, storage.
4 - Very good knowledge base	Identify media & very good knowledge of the basic range of deterioration issues for most media	Very good knowledge of best practices for handling, housing and storage for most media.
5 – Strong knowledge base (comprehensive)	Identify types, formats and deterioration	Comprehensive knowledge of best practices for handling, housing and storage of all media types.

The following is a closer look at the benchmarks in assessing *Fair to Good*, *Very Good* and *Comprehensive* with regards to best practices:

Fair to good: Knows how to handle some media, knowledge of different housing options, for example for film, open reel, some knowledge of storage methods such as vertical orientation for common magnetic media such VHS, Betacam, phonograph discs.

Very good: Knows how to handle most media according to best practices, knowledge of most housing options for most media and knowledge of storage methods for most media according to best practices.

Comprehensive: Knowledge of how to handle all media according to best practices, knowledge of housing options and reasons for the specific options for all media and knowledge of storage methods for all media according to best practices.

The following summary of climate, housing, and storage methods used in members' archives was based on what was observed during site visits.

5.2 Climate

“ISO recommendations further stress that proper storage and handling practices are key for physical preservation. Storage environment is the single most important factor for stability; it benefits large collections and single objects as well until they can receive attention.”²⁵

20% of the member archives access off-site storage (including the use of the Provincial Archives of Alberta storage facilities) and most use this storage for a small portion of their AV. In all but one instance, the facilities are climate controlled to readings comparable to those in their central archive storage.

80% of the members' archives do not have off-storage and rely entirely on on-site storage facilities.

5.2.1 Monitoring

The monitoring of temperature and relative humidity over time is important and recommended, as it gives data readings from which archivists can address less than acceptable climate conditions.

73% of the archives have ongoing monitoring, such as data loggers, of the temperature and relative humidity in their archive storage where AV is held.

27% of the archives do not have monitoring at this time. However, five archives have data loggers on site ready to be installed.

5.2.2 Recommended Climate Conditions

Table 14: Recommended Relative Humidity and Temperature²⁶

Media	RH %	Acceptable Temperature
Motion Picture Film, acetate and polyester	30-50	-18 to 4C ideal to 12C acceptable
Phonograph disc, Wire, Cylinders	30-50	-5 to 12C
Magnetic media: open reel, cassettes, audio and video	30-50	12 to 15C

A temperature of 12C would be acceptable to all AV media. There are current research studies on the effect of freezing magnetic tape, but at this time, the recommendation continues to be to not store magnetic media under 8C, as cold and frozen temperatures appear to lead to lubricant separation and exudation.²⁷

“Recent film stability studies have reinforced the need for cold storage for long-term preservation. Long-term preservation of both new and old film materials requires a climate that is colder than room temperature. This is even more critical if the film is already beginning to degrade.”²⁸

According to research, new acetate motion picture film will last approximately fifty years if stored at 18C and 50% relative humidity. However, no film in the archives surveyed is new. All film predates 2005, and most predates 1990.

Temperature has a more significant effect on polyester based film than relative humidity, specifically on the stability of the colour dyes, as mentioned in Section 4 above. For this reason, it is recommended that this film be ideally stored at cold (4C) or frozen.²⁹

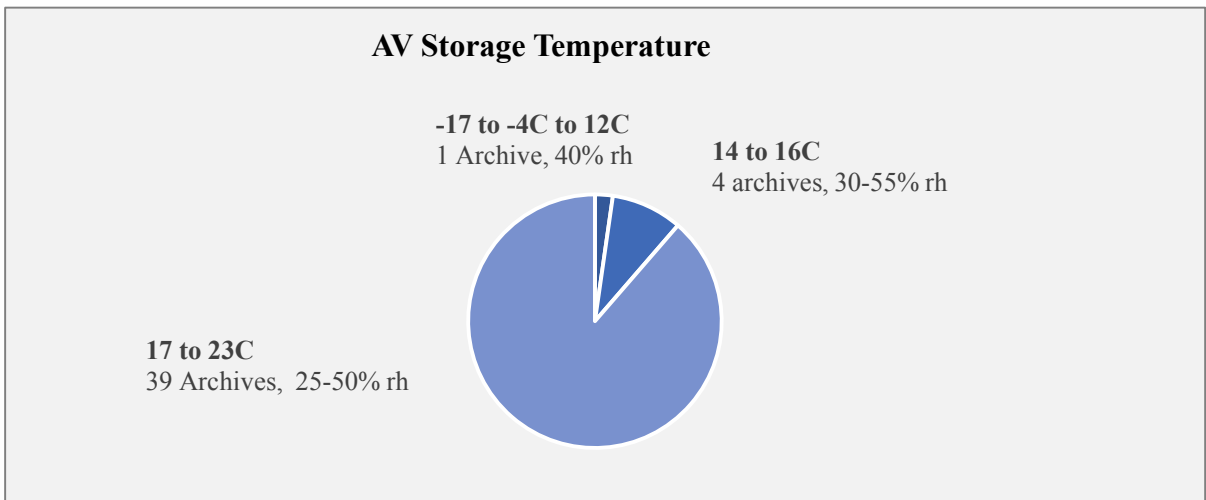
10 reels of nitrate motion picture film were located in one archive during this survey. It is recommended that nitrate be stored at 30%-40% relative humidity, and frozen.

5.2.3 Temperature in members' AV storage

“...as far as temperature is concerned, it is the *sustained high temperatures* that have the most significant impact on the stability of the collection materials, not the temporary spikes or wide fluctuations of temperature. In other words, it is not the change that is important, but the length of time spent at high temperatures. When analyzing the quality of collection storage conditions, it is better to ask, "Can I find a way to lower the temperature?" rather than, "Can I find a way to reduce fluctuations in temperature?"³⁰

Approximately 90% of the archives surveyed have storage temperatures that exceed the recommended acceptable temperature for AV materials.

Figure 8: Average Storage Temperature in Member Archives

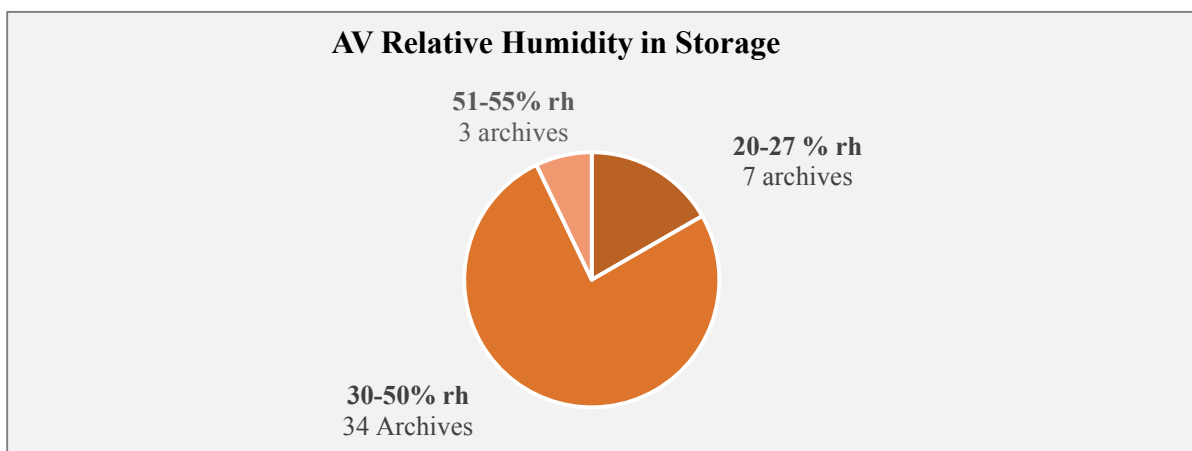


1 archive meets ideal conditions of temperature and relative humidity for all AV media holdings. 10% of the archives have ideal or acceptable storage for AV, excluding phonograph discs, wire recordings and cylinders. 90% do not meet recommended acceptable climate standards for AV media.

5.2.4 Relative Humidity in members' AV holdings storage

As indicated in **Figure 9** below, the majority (77%) of the archives in this survey are within the relative humidity range recommended for AV material.

Figure 9: Average Relative Humidity in Member Archives



5.3 Housing, and Storage Methods

Housing (enclosures for individual media) and storage methods (orientation and organization of media on shelves) are significant factors in the conservation of archival material, as they can, to different degrees, affect the chemical, biological and mechanical state of the media over the long term. Best practices in housing, storage methods and handling for analogue AV media are outlined in Appendix B.

5.3.1 Motion Picture Film

Approximately 80% of the members' films are acetate base. As acetate film deteriorates, it produces acetic acid. If the acetic acid is trapped in the can due to the lid's tight fit, the deterioration accelerates due to the auto-catalytic nature of the process. For this reason, it is important to use ventilated cans that are made from acceptable plastics such as polypropylene or polyethylene. Polyester based film accounts for approximately 20% of those archives surveyed.

Nitrate-base film is highly flammable (can self-ignite at ambient temperatures around 100 degrees F), cannot be extinguished once ignited, and is therefore a serious fire hazard. Quantities of nitrate film in excess of 25 pounds are subject to storage and handling standards prescribed by the National Fire Protection Association (NFPA). It is recommended nitrate motion picture film be housed in ventilated metal cans, and stored separately from other archive materials.³¹

78% of the archives with film holdings require re-housing of their film due to one or more of the following reasons: Metal cans that should be replaced by polyethylene, plastic cans that should be replaced with metal cans in the case of nitrate film, damaged plastic cans, plastic and paper stored with the reel of film, more than one reel stored together in stacks in a can, no identification labels on can, misidentified base type, no housing.

58% of the archives with film holdings do not use best practice storage methods in one or more of the following ways: Storing vertically, or in stacks of different diameters and to a height exceeding best practices, storing acetic and non-acetic film and other archive material in the same area.

5.3.2 Magnetic media

11% of the archives with magnetic media (cassette or open reel) require re-housing of this media due to one or more of the following reasons: Dirty, torn/damaged, or no housing.

68% of the archives with magnetic media (cassette or open reel) do not use best practice storage methods in one or more of the following ways: Horizontal, and/or intermingled it with other AV formats, including preservation and/or access copies together in the same box or bound together with elastics.

5.3.3 Phonograph discs

33% of the archives with phonograph discs require re-housing of this media due to one or more of the following reasons: Acidic and/or dirty sleeves, no sleeves and/or disc jackets.

67% of the archives with phonograph discs do not use best practise in their storage of this media by stacking and storing them horizontally (flat).

5.3.4 Cylinders

All of the archives with cylinders require re-housing of this media due to one or more of the following reasons: Cylinders are unsecured in a box, are stored either horizontally, have no housing.

All archives with cylinders require storage method implementation according to best practices.

Summary

1. The knowledge and skill level in the archives, on average, does not meet best practices for care of AV archival material and impacts the intellectual control, and consequently, long-term preservation of and access to the holdings.
2. 10% meet ideal or acceptable temperatures in the storage of their AV material.
3. 77% of the archives meet recommended ranges of acceptable relative humidity standards in their AV storage vaults.
4. Approximately 75% of the archives surveyed do not store their AV according to best practices
5. More than half of the archives' AV is not housed according to best practices. Excluding the magnetic media, which is, for the most part, housed in original, acceptable housing, the percentage of AV not housed to best practice standards rises to 70%.

6 LEGACY EQUIPMENT AND EXPERTISE

6.1 Legacy equipment

As has been discussed above (Section 4 above), the availability of legacy machines, parts, service manuals, testing tools and expertise in repair is diminishing steadily, and as a result, subjecting media to different levels of risk of obsolescence. Thirty-three of the forty-four archives have at least one AV legacy machine. In addition, one archive, has a large number and variety of parts and non-working audio, video and film equipment as a resource for future equipment repair. Below is a summary of legacy equipment for analogue AV media in member archives.

6.1.1 Audio Equipment

The survey of legacy audio equipment available in members' archives, found that there are an approximate total of 37 items in working order. For 15 items, it is not known if they were in working order or not. 2 items were deemed not in working order.

Table 15: Audio Equipment in Member Archives

Audio item	Working	Condition Not known	Not working
Audio cassette recorders/players and converters	18	8	2
¼" open reel to reel players	4	1	1
Turntables	1	3	
Miscellaneous audio: stylus', speakers, mics		?	

There is one archive with a fully operational ¼" open tape digital suite than is capable of reformatting to preservation and access digital surrogates. There are approximately six archives that have the capability of digitizing audio cassettes to access file format surrogates.

6.1.2 Video Equipment

Table 16: Video Equipment in Member Archives

Video item	Working	Condition Not known	Not working
VCR: recorders/playbacks/converters	14	6	
U-Matic playback	3	2	
Betamax	1	1	
Monitors		2	
Hi8 handycam	1	1	
Video 8 recorder	1		
Betacam decks	1		
Betacam digital suites	1		

Except for one archive, archives that use their own legacy equipment to reformat to digital are able to reformat to access file format only. Their equipment does not have the capacity to reformat to preservation file format standards.

The challenge in many cases is not knowing how to determine the level of working order of a piece of equipment, as personnel are not familiar with the equipment.

6.1.3 Motion Picture Film equipment in member archives including microfilm readers and filmstrip readers.

Table 17: Motion Picture Film Equipment in Member Archives

Equipment	Working	Condition not known	Not working
Film scanning (2K)	1		
Film shrinkage gauge	1		
Film flatbed viewing	1		
Optical track reader	1		
16mm Rewinds, vertical	9		
Projectors 16mm	4	19	
Projectors 8mm	2	4	
Projectors super-8mm	1	2	
Projectors 28mm		2	
Film rewinds, 16mm			
Editors/viewers 8mm, s-8mm	2	3	
Perf repair kits 16mm	1		
Combo splicers 16/8/s-8mm	2	1	
16mm splicers	3		
4-gang synchronizer 16mm	2		
Squawk box	2		
Super-8mm camera		3	
Filmstrip reader	1		
Microfilm reader	2	2	
Miscellaneous: take-up reels, splicing tape, splicing cement, skid plate			

The lists for each type of equipment are conservative, as they are based on what archives knew they had and could locate.

In addition, although archives list a significant number of AV equipment items in working order, they also are clear that many of those items have not been serviced recently, thus their condition to handle archival material is not known at this time.

6.2 Technical Repair Expertise

Research into locating expertise for repairing and/or retrofitting legacy AV equipment did not result in many technicians with this expertise: One individual in Southern Alberta and one has relocated to Vancouver but who continues to do contract work in Alberta on occasion. This is an area that needs more time for research and networking through the audiovisual community. As well, one aspect of my conversations with technical people in this field, was that individuals were consistently and increasingly find it difficult to find parts for the different machines. A number of

technicians also commented that there was a large demand for this expertise which simply could not be met by the handful of individuals with the expertise.

Summary

1. The legacy AV equipment that is located in the archives represents a significant number of machines and a large number of un-inventoried parts. This summary is conservative, as a number of archives believed they had more equipment “somewhere else”.
2. The level of working order of the machines needs to be determined – from whether its limit is the motor turning on and the gears turning, to its being fully functioning and safe for handling archival material.
3. To determine the level of working order of the equipment that is considered working on the above lists, technicians need to be located to carry out the necessary testing, evaluation, repair and, if necessary, retrofit.

7 DIGITIZATION

7.1 Policies: Collection, Preservation, Digitization

The care and preservation of analogue moving image and sound media is particularly challenging in terms of the financial and changing technological resources it demands. It is recommended that long-term preservation of the holdings be addressed through an articulated, written policy that encompasses the entire holdings, clarifies the organization's relationships between its mission, collections acquisition, access and security and preservation initiatives, and identifies and prioritizes what is to be preserved, why and for how long.³²

Many of the archives assume AV to be included in their collection policy, though the media is not addressed specifically. Very few archives have written preservation and/or digitization strategies in place, that incorporate the entire archive.

7.1.1 Collection Policies

23% of the archives mention AV media in their collection policy. One archive clearly states it does not accept motion picture film. (Their decision was based on the fact that the particular care it entails is beyond their means). The remaining archives that address AV media do accept it.

77% of the archives do not address AV in their collection policies, but assume it to be included as media they accept.

7.1.2 Preservation, Digitization Policies or Plans

In discussions with the archives, many archives did not have a clear idea of what would constitute a preservation or digitization strategy for the archive. The majority of archives who are addressing digitization are doing so on a case-by-case basis, in response to periodically available grants and pressing demands for access that arise.

18% of the member archives have a long- or short-term preservation strategy and/or digitization strategy that encompasses the entire archive, whether it be a general outline or, in the case of several (4%), a clear and detailed digitization policy that encompass the entire archive.

The remaining 82% of the member archives do not have a long- or short-term archive preservation or digitization strategy in place, that encompasses the entire archive.

7.2 Digitization: Preservation and Access

AV media will suffer loss through deterioration and obsolescence of equipment playback, as well as possibly through other means (handling, playback damage, disasters such as floods or fires). To safeguard against, and in other cases mitigate this loss, it is recognized among archival and technical research professionals that the media must be reformatted to a digitized surrogate, in order to be preserved for the long-term and made accessible in the short-term.³³

Reformatting to a digital format presents a number of challenges, and these challenges become more acute and multi-faceted, depending on the purpose of the digitization - for preservation or for access, and according to the media type to be digitized – audio or video. One aspect of the complexity involved in the decision-making process regarding digitization, is that there is no one

correct master file format for all applications, as all format choices involve compromises between quality, access and lifecycle management. Another important deciding factor in the selection of file formats is the sustainability of file formats for long term preservation and access. Library and Archives Canada has evaluated the sustainability of file formats and created the following benchmarks for assessment that are presented in **Table 18** below:

Table 18: File Format Sustainability Benchmarks³⁴

Benchmark	Explanation
Openness/Transparency	The relative ease with which knowledge of the file format and its technical information can be accumulated.
Adoption as a preservation standard	This addresses the extent to which the format has been formally adopted by national libraries, archives, and other memory institutions internationally.
Stability/Compatibility	a) The degree to which the format is backward and forward compatible. b) The degree to which the format is protected against file corruption. c) The relative frequency of release of newer or replacement versions of the format over time.
Dependencies/Interoperability	The degree to which the format relies on a particular hardware or software, reader, etc.
Standardization	The degree to which the format has gone through a rigorous formal standardization process.

Since the purpose of creating preservation file format surrogates of AV media is to provide quality long-term availability of the content, it becomes important that the reformatting process capture as complete and a high a quality digital file as possible. This demands well-maintained playback machines, a high level of expertise in the technical functioning of the legacy and digital equipment, and substantial knowledge and skills regarding the components of quality control.

Access file formats, are typically compressed, smaller, take up less space, and therefore, potentially upload and download much more quickly than preservation file. The lower quality digital access file formats allow for quicker real time transfer and demand less complex expertise in the transfer, generally. These factors make these file formats less costly to produce.

Moving image digitization presents greater challenges than audio for archives in terms of cost: More server space is required for the much larger files, as well as more complex technical expertise in the reformatting (decision-making and technical transfer) and quality control.

Finally, considerations and decisions regarding metadata are important, as metadata is a critical component for the retrieval, use or management of the information.

The above brief (and incomplete) overview of a number of the important issues faced by archives in the digitization decision-making process, are issues all archives in this survey find challenging, as they lack the specialized knowledge and expertise to make these decisions, or confer and communicate effectively with vendors to that end.

In terms of digitization of AV holdings, the present survey found that the members' AV holdings are significantly at risk. Thirteen archives, representing 3,520 AV items, have none of their audiovisual holdings digitized, either to preservation or access file formats.

The remaining thirty-one archives have, together, an average estimated 17% of their AV holding digitized to access and/or preservation file formats: An estimated 10% of AV is digitized to access file format only, and an estimated 7% of AV is digitized to both preservation and access file formats. In a number of instances, the digitization file dates from the 1990's.

The format most digitized in member archives are compact audio cassette (3,350), followed by ¼" open (764), film (309), U-Matic (260), and phonograph discs (130 aluminum discs).

7.3 Outsource, In-house, Combination

The thirty-one archives that digitize their AV holdings, utilize outsourcing or a combination of in-house and outsourcing to meet their AV digitization needs.

55% of archives, outsource only. 45% of archives combine in-house facilities and outsourcing to local independent houses, as well as to larger digitization facilities. 54% of the archives that outsource, outsource to the Provincial Archives of Alberta, primarily for digitization to preservation and access file formats of compact cassettes, ¼" open tape and, on occasion, phonograph discs.

Summary

1. A low percentage of AV holdings are digitized: 3% of AV have no AV digitized to either preservation or access file formats, and 17% of the remaining AV items are digitized to either preservation and/or access file formats.
2. Overall, archive personnel generally lack the necessary specialized knowledge and expertise to make preservation and access digitization technical and planning decisions for audio, and in particular for moving image media. In discussions with the archives, many expressed they were not clear about the distinction between digitization for preservation and digitization for access purposes. A number of archives expressed the understanding that if an item was digitized to access file format, it was preserved and preserved forever.
3. With approximately 80% of the archives not yet having a comprehensive short- or long-term preservation or digitization plan or policy in place, for co-ordinated fiscal, human resource and technical planning and management of digitization of their holdings, the long-term preservation of AV is compromised.

As it becomes increasingly evident by the sheer numbers of AV items, combined with the media's continued deterioration, and the steadily waning availability of equipment, parts and technical expertise that is a necessary part of the reformatting process, not all archival AV can be preserved as a digital surrogate. Given this situation, the ability to identify, access, determine archival value of, and prioritize the media to a very high degree becomes even more crucial.

8 RESOURCES: EXISTING AND POTENTIAL

8.1 Expertise and potential resources in member archives

The survey found that there is a small, core source of substantial knowledge, skill and experience in AV media identification, technical expertise and best practices, both on an organizational level and on an individual level. In terms of organizations, this knowledge and expertise is evident in 9% of the ASA institutional member archives. These archives have a strong combined knowledge, skill and experience base in motion picture film, magnetic media and/or other AV legacy formats. Accessing this resource, through information and skills sharing could benefit Alberta archives that do not have these resources.

It is also evident through the survey, that there are a number of individuals throughout the archive membership, and located in the north, central and south of Alberta, who have significant knowledge and technical expertise and experience in select AV format identification, handling and best practices. These individuals are a valuable, potential resource for the archive community at large in the handling and caring for their AV holdings.

9 CONCLUSIONS

Overview

The findings from this survey reveal that AV items have a strong presence in Alberta (121,314 items), are largely archival (75%) and have a significant number at high risk (5%), due primarily to inherent risk of deterioration and playback obsolescence. Further, it was found there is a need for greater intellectual control over the AV archive holdings, due to lack of the specialized knowledge of AV material formats and care, and playback obsolescence. In addition, it was found that 90% of the archives' storage is not within recommended temperature ranges for AV media. In terms of digitization, approximately 80% of the archives do not have a digitization or preservation strategy plan or policy in place for the archive. Finally, the digitization of analogue AV to preservation and/or access file formats is low, at 17% of all AV.

The total AV of 121,314 items across the membership, is not insignificant, and this is a conservative total. Audio accounts for 64%, video for 24% and film for 12%. Of the total AV, an estimated 40% of the sampled AV, (23% of the total AV, including that which was not sampled), is at high risk due to deterioration present in the media when sampled, inherent deterioration and/or playback obsolescence due to the specific format. Almost two thirds of the film holdings are at risk for deterioration that is present, as well as for inherent deterioration. Almost one quarter of the audio and one quarter of the video are at high risk, due primarily to inherent deterioration risk and playback obsolescence. Of the total audio and video items at high risk, playback obsolescence accounts for the largest number (50%) and inherent risk of deterioration the second largest number (44%).

There is an important resource of individuals with AV knowledge and expertise in the Alberta archive community. However, these individuals are scattered through the province and mostly unknown to other archives. There are also a small number of archives (9%), that have medium to high levels of knowledge and skill in the care of AV using best practices. In contrast, 25% of the archives have no knowledge with which to identify or care for AV based on best practices. 60% of the membership lack sufficient knowledge to identify AV formats and various serious deterioration types and levels, as well as the knowledge of how to handle, house and store the holdings according to best practices. The challenge to adequately describe the AV items, compromises the level of intellectual control archives have over their AV holdings, what AV they have (formats), the quantity they have, and their condition, as well as compromising the care and therefore preservation of these holdings.

A second aspect driving the challenge to intellectual control over AV records, is the increasing lack of analogue legacy playback. There is wide-spread inability of archives to play back this media and so determine the content and significance of the content. This challenge impedes archives in taking the necessary steps to prioritize materials for digitization to preservation and/or access files.

The archive community is struggling with digitization of their AV holdings both in terms of a preservation and access. With 80% of the archives not having a preservation or digitization strategy that encompasses the entire archive, the decision-making and implementation of digitization is carried out primarily on the basis of a demand for access. There is a need for basic knowledge of the digitization decision-making process and its components (technical aspects of digital surrogates and equipment, metadata options, quality control, subsequent management of these holdings, and costing).

9.2 Short Term Needs and Recommendations

9.2.1 Knowledgeable AV technical and management resource person

Need

There is a need for analogue and digital media expertise oversight to guide and provide consultation to archives in their next steps of preparation for, decision-making process and implementation of the digitization of their AV media to preservation and access surrogates.

Recommendation

It is recommended that a digital media preservation specialist with AV preservation technical, metadata and management experience be hired to initiate, guide and provide consultation to the archives in their decision-making in the digitization of their AV analogue to digital (preservation and access) surrogates.

9.2.2 Analogue and digital AV media knowledge and skill

Needs

The following knowledge and skill areas are needed by approximately 90% of the member archives surveyed. These members also expressed strong interest in attending workshops on this content.

- a. Identification of media types and formats, and identification of deterioration types and levels for each media format.
- b. Best practices: Knowledge of best practices in the handling, housing, storage methods and climate and monitoring.
- c. Digitization: Basic knowledge of the central components in the decision-making process in creating preservation and access digital surrogates, addressing best practices in consideration of the technical, management, metadata and costing issues.

Recommendations

Provide workshops throughout the province of Alberta to address the above three knowledge areas of critical knowledge and skill needs.

9.2.3 AV legacy technicians

Need

There is a pressing need for the repair, assessment and expertise in the use of known existing legacy equipment in the province.

Recommendation

Carry out more extensive research and outreach in the province of Alberta to locate technicians who have the expertise to assess, repair, retrofit if necessary, and use existing legacy equipment.

9.2.4 Creation of detailed inventories of AV

Need

The member archives need greater intellectual control over their AV material in order to adequately determine the media's number, assess archival value and condition, and to facilitate the decision-making process for digitization of these holdings to preservation and access file surrogates.

Recommendation

In conjunction with the knowledge workshops above, it is recommended that archive AV holdings be inventoried with condition reports that include technical aspects that will eventually be important in the digitization decision-making process, such as real time running time, recording speeds, sound or silent films, for example.

9.2.5 Housing and storage methods

Need

A large percentage of the housing and methods for AV storage in member archives are inadequate and increase the risk of deterioration of and mechanical damage to the media.

Recommendation

It is recommended that archives carry out best practices housing and storage methods of their AV holdings.

9.3 Long term Needs and Recommendations

9.3.1 Climate Controlled Storage

Need

The survey found that while the majority of archives did meet relative humidity recommendations for AV media, 90% had temperatures in their archive storage that exceeded that recommended for AV. Implementing climate recommendations, specifically for temperature, is generally a prohibitive cost for many of the archives. While portable frost-free freezers would address the climate concerns for motion picture film, it is not recommended for magnetic and the remaining media formats.

Recommendation

Research options for a number of centralized storage options with climate control and monitoring, including situations where costs could be shared among participating archives.

9.3.2 AV resources

Need

There is a need in the Alberta archive community for a single AV resource point that is public and easily accessible, to provide current information regarding analogue as well as digital preservation and access technical and management AV archival issues.

Recommendation

Create an online blog and web page to specifically address analogue and digital AV technical and management issues at the Archives Society of Alberta.

9.3.3 Digitization Facility Options

Need

Archives must move closer to digitization of their AV holdings due to high inherent deterioration and increasingly high playback obsolescence, there is a need to identify AV digitization facilities in the province and assess them for archival best practice in terms of handling and digital preservation and access file creation.

Recommendation

Research and vet digitization facilities and independents in Alberta for archival best practices in the handling of AV material, and in the digitization to preservation and access surrogates.

9.3.4 Digitization of AV analogue holdings: Implementation

Need

With 3% of the AV holdings of the surveyed archives having none of their AV digitized to preservation or access file format, and only 17% of the remaining holdings having digital preservation and/or access files, it becomes imperative that the planning of the implementation of AV material in Alberta begin, before the content becomes inaccessible through deterioration or playback obsolescence. The above-mentioned needs for knowledge and skill to identify formats and their condition, and determine content for archival and access purposes, and put in place preservation or digitization plans or policies, are necessary first steps to implementing digitization of these holdings.

Recommendation

Start decision-making process for and digitization of prioritized analogue AV media to preservation and access surrogates.

9.3.5 Existing knowledge and skill resources

Need

The majority of archives lack the necessary knowledge and skills to identify and care for their AV holdings according to best practices.

Recommendation

In addition to providing workshops, as mentioned in 10.1 above, it is recommended there be a longer-term strategy to co-ordinate existing knowledge and skill resources and expertise in analogue and digital AV in the province. With strong expertise and well-maintained equipment in select archives, there is a potential to explore the possibility of identifying specific archives as centres of digitization expertise and technology.

Acknowledgements

Special appreciation and thanks to the Institutional Member archives for their time and effort in providing valuable information for this member survey and assessment, and for their patience and cooperation throughout this project.

The ASA gratefully acknowledges the Documentary Heritage Communities Program from Library and Archives Canada for their generous support of the Audiovisual Preservation and Access Survey and Assessment Strategy Project.

APPENDIX A: High Deterioration Risk of Magnetic Media

Categories of Risk

Three categories of risk used in the preservation risk assessments:

I Deterioration Present

The most serious and therefore highest risk types of deterioration of AV media are identified as follows:

- a. **Acetate** base deterioration (commonly referred to as “vinegar syndrome”) and primarily evident in acetate base motion picture film and open ¼” audio tape;
- b. **Binder** hydrolysis (SSS – sticky shed syndrome, SBS-UP – soft binder syndrome – unidentified problems), and primarily evident in polyester open reel and audio compact cassette magnetic media (less common in cassette magnetic media); and
- c. **Loss of plasticizer**, producing a whitish surface powder – the exudation of palmitic and stearic acid, in lacquer phonograph disc delamination.

II Inherent Risk of Deterioration

Those formats that are inherently at risk for deteriorating in the particular ways as outlined in Deterioration Present, above.

III Obsolescence of Playback Capabilities

A format is deemed obsolete when “the machine or device necessary to render the work perceptible is no longer manufactured or reasonably available in the commercial marketplace”.

The evolution of obsolescence.³⁵

End of manufacturing

- b. End of availability in the commercial marketplace
- c. End of bench technician expertise
- d. End of bench technician tools
- e. End of calibration and alignment tapes
- f. End of parts and supplies
- g. End of availability in the used marketplace
- h. End of playback expertise

Additional Risk Factors for Magnetic Media

The following properties of magnetic tapes were noted but not taken into consideration in the assessment of a given format’s high risk level.

I Tape thickness plays a part in risk, primarily in terms of mechanical, as thinner tends to be more fragile. As less of a significant driving force in degradation, it was not used in the assessment of media in this project.

II Age alone does not appear to significantly drive deterioration for audio tape (open or cassette).

³⁶ For this reason it was not used in the assessment of media in this project.

III Brands – major and generic

“There is agreement among preservation engineers that tape from major manufacturers is more consistent, reliable, and stable. Off-brand tapes often do not perform consistently, even if they appear to be from the same batch. They may vary wildly in both their physical and magnetic properties and suffer from manufacturing problems ...”³⁷.

Over time, certain brands appear to be more vulnerable to different types of chemical deterioration and mechanical vulnerability. Brands were not taken into consideration in assessing the media for highest risk.

IV Track configuration, recording speed and noise reduction

These are important properties of the media to identify in order to determine particular playback requirements, in some cases, as well as for the accurate technical reproduction of the content. These properties were not taken into consideration in this assessment.³⁹

V Wind integrity of the pack

The wind integrity of tapes was noted but not used as an evaluating tool to determine the highest risk media. This property of media is significant in its more severe forms, as it will impact, for instance, the ability to reformat the media to a high quality digital file. The following are the basic wind properties that compromise the media in terms of playback, and in some cases, include loss of content: Popped strands, flange pack, step pack, spoking, frilling, cinching, windowing, edge damage.⁴⁰

Inherent Risk Formats

I Audio Open ¼” tape

a. *Base* components

Base components of open reel magnetic audio tape may consist of cellulose acetate, PVC (polyvinyl chloride base), paper or polyethylene terephthalate (PET) (a polyester, which is often referred to by its common trade name Mylar (Dupont brand) or Tenzar (3M brand) and polyethylene naphthalate (PEN), also a polyester, stronger than PET.

i) *Cellulose acetate*: High risk due to high inherent risk of serious deterioration

The earliest audio tape (which was acetate) was manufactured in Germany approximately 1934, and was widely manufactured in the US between 1948 and 1972, and through the late 1970's. It includes motion picture film, microfilm, filmstrips, and audio tape (open tape only). Note these formats are not exclusively made of acetate, but were manufactured in polyester, as well. Cellulose acetate's susceptibility to hydrolysis (chemical reaction with moisture), results in the formation of acetic acid, commonly referred to as “vinegar syndrome”. This process is auto-catalytic, producing increasing amounts of acid and thereby accelerating the deterioration process. They are therefore chemically unstable. Acid Detection strips can help determine levels of deterioration.⁴¹

Acetate tape can be distinguished from polyester tape, by holding the reel up to a light and looking through the reel. Acetate transmits light and polyester does not transmit light.

ii) *PVC*: Low risk as it has been seen to be stable over time in terms of its base, but high risk if binder deterioration is present. PVC is a polyvinyl chloride base tape manufactured in the US from 1943-1969. It is the most resistant base material in terms of physical robustness and base chemical deterioration. Unlike acetate-based tape, it does not undergo base deterioration in the form of “vinegar syndrome”.

iii) *Polyester*: The two types of serious deterioration are exclusively found in polyester tapes, one in tapes that are back-coated (SSS) and the second in tapes that have no back-coating (SBS-UP). SSS and SBS-UP are types of binder deterioration that weaken the bond between the base and the magnetic layer.

- Sticky Shed Syndrome is only found in polyester tape with a back-coating. The polyester urethane binders are susceptible to hydrolysis, through moisture such as present in the relative humidity of the storage climate. This chemical reaction is accelerated by higher temperatures. SSS is identified by the evidence of oxide and backing-shed on the tape, and sticking and squealing of the tape as it moves past the tape guides in playback.⁴²
- Soft binder syndrome is only found in polyester based tape that has no back coating. It has similar and different symptoms as sticky shed syndrome. The citing of the loss lubricant as the explanation for the symptomatic signs of sticking and squealing is more likely a form of deterioration.⁴³

Table 19: Tapes Vulnerable to SSS and SBS ³⁸

Tapes that end to suffer from SSS	Tapes that tend to suffer from SBS
Pre-1990 Agfa PEM 468 and PEM 469	Scotch/3M 175
Ampex/Quantegy 406, 407, 456 and 457	Sony PR-150
Early 1980's Audiotape/Capital: Q15	Melody 169 (3M seconds)
Scotch/3M: 226, 227, 806, 807, 808 and 809	Pyral tapes (type numbers unknown)
	Any cassette that squeals

iv) *Paper*: Low risk as the paper has been seen to be stable over time. Paper backed tape was manufactured in the US from 1947 until the early 1950's. It's most vulnerable aspect is its fragility. The backing feels and looks like paper, distinguishing it from acetate or PVC.

Appendix B: Best Practices Care

All AV materials should be stored on coated metal shelves, not wooden shelves.

As the case with other archival type of materials, originals, access and preservation copies should be stored separately from each other.

I Motion Picture Film⁴⁴

Handling

Handle motion picture film with nitrile gloves (cotton gloves if nitrile is not available).

Housing

1. House film in polypropylene or polyethylene plastic, acid-free cardboard or non-corroding metal cans that pass the Photographic Activity Test (PAT).⁴⁵ Include no plastic, elastic, or paper with the film.

2. Best practices recommend film be wound on 3" polypropylene or polyethylene cores, emulsion side out using a medium tension wind that results in a flat (no ridges) wind. If, however, the equipment (film rewinds) or experience handling film this way (rewinding to cores) is not available, the films may remain on the reels for storage as long as the reels are not bent, rusted or damaged.

3. Best practices for housing small gauge 8mm, super 8mm, 9.5mm motion picture is to leave them on their reels, rehouse them in polyethylene cans.

Labelling

Using removable archival labels, label each can, adhering the label to the side of the lid.

Storage method

Store film horizontally, labels facing outward, in stacks of the same diameter (e.g., 800' cans together, 1200' cans together, etc.) and no higher than eight cans high.

Nitrate film should be stored in metal cans and isolated from other collection items.

If the nitrate holdings are approximately 5,000 feet or more they are required by law to be stored in approved storage cabinets or vaults with proper ventilation.⁴⁶

II Magnetic Media⁴⁷

Handling

Handle by the edge of the plastic or metal reel (the flanges) and centre hub only. Do not handle spools.

Housing

House audio and video cassettes in polyethylene cases or acid-free boxes.

House open reel audio and video, in polyethylene cases or acid-free boxes, one reel per box. Do not include paper, elastic or plastic in the box with the tape. Use acid-free tape to secure the ends.

Storage method

Store audio and video magnetic media vertically, standing on their short edge.

III Record Protection⁴⁸

Best practices recommend that to ensure magnetic media cassette recordings are safeguarded from being lost through inadvertently recording over them, the record tabs on the cassettes be moved, or removed:

Cassettes: the protection tab is in the upper corner of the cassette, opposite the end consisting of the tape path. Remove both tabs, as there is a tab for each side of the cassette.

VHS: has a tab on the long edge where the label usually goes, near the corner. Remove it to protect.

Betacam cassettes have a small red plastic button - when the button is up it can be recorded over, when down it is protected. Ensure the button is down.

Betamax cassettes have a small record tab on the short end. Remove the tab to protect it.

MiniDV has a slide mechanism in REC position or in SAVE position. Move to SAVE position to protect.

U-Matic/U-MaticSP has a medium-sized red button on the back of the cassette. Remove it to protect.

IV Phonograph Discs⁴⁹

Handling

Handle all phonograph discs, with archival gloves on, by edges only, with hands at about 3 o'clock and 9 o'clock to avoid stress on the disc.

Housing

All phonograph discs should be housed in acid free sleeves. Recommended are record sleeves with a high-density polyethylene sleeve (e.g., DiscWasher V.R.P., Mobile fidelity Original Master Sleeve, Nagaoka No. 102 Anti-Static Record Sleeve) or acid free sleeve.

Storage Method

1. Store discs on coated metal shelves that have the full height and depth of the phonograph discs, with sturdy immovable dividers every 4-6 inches, that support the entire face of the disc. The dividers should be the full height and depth (no overhang) of the discs.
2. Do not store grooved discs of different diameters together.

V Cylinders⁵⁰

Handling

1. Hold with middle and index fingers, open to a V shape, in the cylinder. Do not touch the outer, grooved surface (the playing surface) of the cylinder.
2. Allow wax cylinders from cool storage to acclimate to room temperature before touching to avoid thermal shock.

VI Playback

Best practices regarding use of playback equipment in an archive is to not playback archival material unless the equipment has been serviced by a technician who knows how to repair and service that piece of equipment and is aware of the issues around the archival material the playback would be used for.

Appendix C: Methodology of Survey

Outline of Project Procedure

The initial steps of this project were the clarification of the project deliverables and the setting of the project plan framework within the context of those deliverables. An outline of the project plan was detailed that included specific milestones, an overall timeline, the creation of initial test questionnaire templates based on the goals of the project, and a general plan for carrying out the site visits. Benchmarks were established for an assessment of the knowledge and skills of AV identification and best practices, as well as for the sampling inspection of archives' AV holdings. A selection of basic equipment for on-site assessments was purchased.

Archives were contacted to introduce and explain the project, its goals and the how they were being asked to participate. The archives were provided with the two questionnaire templates (General Questionnaire and Detailed Inventory Questionnaire) to review in advance of the site visit. These questionnaires follow in Appendix D below.

The duration of each site visit, was on average two to five hours. A number of sites required a second visit. The visits included an initial meeting and discussion with the archivist or archive manager to complete the general questionnaire and the detailed inventory, that would provide information on the archive, as well as the knowledge and skills available in the archive for AV identification and best practices care. A tour of the site vaults and holdings was carried out during this visit, at which time photographs of the housing and storage methods, and examples of media type, format, and condition were done. The third component of the site visit was the sample inspection of each AV media type and format, and condition assessment of the archive's AV holdings

Follow-up to each site visit included an email to the archive, summarizing the site visit discussion, as well as providing recommendations and specific resources, for their AV material.

Subsequent to the completion of all site visits, follow-up emails were sent to the archives requesting clarification on certain aspects of their AV holdings, as well as additional information not collected during the site visit.

Appendix D
Audiovisual Site Assessment : General Questionnaire Template 1
Archive: _____ Date: _____

Site Elements	Site Assessment		
	Y/N	%	Comments
Name of Institution Address Hours			
Primary Contact, responsibility			
Affiliation			
Policy: <i>Strategic</i> Plan preservation - Short-term, Long-term If so: Is AV preservation addressed in plan			
Collection Policy general, AV addressed specifically			
Digitization Policy - AV addressed specifically			
HR resources: who, how much time allotted to AV/year % staff volunteers - #, ongoing/regular students summer, archivists - #, ongoing/regular			
HR: AV - training: knowledge, skills for identification, handling inspection, conservation, media types, formats			
Resources: Sources of AV assistance - who do they ask when they have questions; Attend Educational, conferences, workshops; network			
Resources: Cooperative programs or collecting policies w/other local collecting organizations			

Appendix D
Audiovisual Site Assessment : General Questionnaire Template 1
Archive: _____ Date: _____

Site Elements	Site Assessment		
	Y/N	%	Comments
Budget: Archive Budget, line for AV or % of overall archive/ budget, Source(s)			
Access: Is there access to AV, if so AV User count - % average yearly			
Access: If access to AV, who is primary user group			
Access: Is AV reformatted for access , % yearly: If so, in-house, outsourced and if outsourced to whom Type of AV			
Access: Is AV preserved , % yearly: If so, in-house, outsourced, if outsourced to whom Type of AV			
Size of AV: % AV relative to entire archive holdings			
Intellectual control: % AV collection described at <i>Fonds</i> level			
Intellectual control: % AV collection described at <i>lower level</i> , Series, Inventory lists			
Archival: % AV Archival			
Technology: Database, Cataloguing system, if so which			
Technology: IT support, in-house, outsourced, combination			
Technology: Backup arrangements, on what, where, how many			
Equipment: Motion picture - working, non-working handling,, inspection, tools			

Appendix D
Audiovisual Site Assessment : General Questionnaire Template 1
Archive: _____ Date: _____

Site Elements	Site Assessment		
	Y/N	%	Comments
Equipment on hand: magnetic media playback - working/non-working/ don't know			
Equipment: servicing - in-house, outsource (to whom), combination			
Environment, : Climate, storage, housing, security			
Environment Processing area (where AV is processed) Storage area; rh/temp (where AV is stored) Monitored, controlled airlock			
Storage: AV holdings on-site, off-site, are types separated, or together (with textual records, for example)			
Housing/Methods: % AV collection standard archival housing: coated shelving for AV archival methods			
Future Building Plans for renovation, expansion or relocation that would involve AV collection			
On-site sample rate:			

Comments:

Follow-up resources:

Appendix D

Audio Visual Site Assessment : Detailed Inventory Questionnaire Template 2

Archive:

Date:

ID = Y - able to identify format, property, N- not able to identify format, property

ID	Film & footage count	#/: extent	Stock: Edge Code, Base Material - (nitrate, diacetate, triacetate, polyester, paper, mixed, unknown) ID:	Stock Manufacturer	Col B/W	Neg: Pos	Tech. Element Neg: camera, dupe, Pos: workprint, A/B roll, release print, Sound Track (type Optical or magnetic) ID:	Condition: Degradation/Decomposition: 1. Physical: perforation damage, base/emulsion scratches, edgeweave, splice damage, repairs, shrinkage, colour dye fading, b/w stock silver mirroring 2. acetate base deterioration, "vinegar syndrome" scale 0-3, nitrate decomposition scale 1-5, , fading, silver mirroring (b/w) 3. mold, fungus 1. Slight, 2. Moderate, 3. Heavy, 4 Extensive 5. unusable ID:
	8mm							
	S-8mm							
	9.5mm							
	16mm							
	35mm							
	Other: e.g., 28mm...							

ID	Microfilm	#/: extent	Nitrate, Acetate, Polyester ID:	Col B/W ID:	Neg Pos ID:	Deterioration/Degradation: Physical - tears, gouges, Chemical - Vinegar syndrome, nitrate decomposition, silver mirroring, Biological - mold, fungus, ID:
	16mm					
	35mm					

2017 ASA Audiovisual Preservation Survey and Assessment Report (Template 2)

Appendix D

Audio Visual Site Assessment : Detailed Inventory Questionnaire Template 2

Archive:

Date:

Comment(s):

ID	Audio tape	#/ Extent ID;	Condition: Degradation/Decomposition: 1. Housing: dirty, damaged, acidic (if paper), 2. Interior of container, edges of tape patterned black, brown, or mustard coloured contamination and for fuzzy or thread-like growths that indicate the presence of fungus. 3. Smell: pungent, acidic, 4. Particulate contamination (tape edge and cartridge): staining 5. Tape edge for white powder - breaking down of tape; container for black/brown flakes of oxide, 6. Tape wind : spoking, popped strand(s), flange pack, edge damage, 7. Reel to reel tape: sticks to pack or twists 1. Slight, 2. Moderate, 3. Heavy, 4. Extensive 5. unusable ID:
	Open Reel		
	1/4" open reel		
	1/2"		
	1"		
	2"		
	Cassette		
	Compact cassettes		
	8 Track		
	Microcassette		
	DAT (Digital Audio Tape)		
	DCC (digital compact cassette)		
	Cartridge - Continuous Loop		

Comment(s):

2017 ASA Audiovisual Preservation Survey and Assessment Report (Template 2)

Appendix D
Audio Visual Site Assessment : Detailed Inventory Questionnaire Template 2
Archive: _____ Date: _____

ID	Videotape	# / Extent	Condition: Degradation/Decomposition: 1. Housing: dirty, damaged, acidic (if paper) 2. Interior of container, edges of tape patterned black, brown, or mustard coloured contamination and for fuzzy or thread-like growths that indicate the presence of fungus. 3. Smell: pungent, acidic, 4. Particulate contamination (tape edge and cartridge): staining 5. Tape edge for white powder - breaking down of tape; container for black/brown flakes of oxide, 6. Tape wind : spoking, popped strand(s), flange pack, edge damage, 7. Reel to reel: sticks to pack or twists 1. Slight, 2. Moderate, 3. Heavy, 4 Extensive 5. unusable ID:
	Open reel		
	1/2 " open reel		
	1" open reel		
	2" open reel		
	Cassette		
	3/4" U-Matic, 3/4" U-Matic SP		
	VHS		
	Betamax		
	Betacam, Betacam Sp		
	Video8/Hi-8		
	D2, D3		
	DVCAM, DVCPRO		
	Other Digital video : D-1, Betacam SX, HDCAM/HDCAM SR, HDV		

2017 ASA Audiovisual Preservation Survey and Assessment Report (Template 2)

Appendix D
Audio Visual Site Assessment : Detailed Inventory Questionnaire Template 2
Archive: _____ Date: _____

ID	Wire Recording	#/ extent	Damage: tangled wire, rusting (steel wires), print-through 1. Slight, 2. Moderate, 3.Heavy, 4 Extensive 5. unusable ID;
	Stainless steel		
	Steel		

ID	Grooved cylinder	#/ extent	Deterioration/Degradation: Physical - warpage, breakage, groove wear, surface contamination 1. Slight, 2. Moderate, 3.Heavy, 4 Extensive 5. unusable ID:
	Wax cylinder (also referred to as Brown cylinder, Edison "Gold-Moulded" cylinder/record, typically 2 1/4" diameter, 4 4 1/4" length		
	Plastic cylinder (also referred to as celluloid cylinder, Edison Blue Amberol, Edison royal Purple Amberol) 2 1/4" diameter, 4 4 1/4" length		

ID	Phonograph Record	#/ extent	Deterioration/Degradation: Physical - delamination, exudation, breakage, groove wear, pits, scratches, cracks, surface contamination (dirt, dust, mold) 1. Slight, 2. Moderate, 3.Heavy, 4 Extensive 5. unusable ID:
	Aluminum disc 10", 12" 16"		
	Lacquer disc (also referred to as Transcription disc, instantaneous disc, 'acetate' disc, direct-cut disc) 7", 8", 10", 12", 13" 16" diameter		
	Shellac disc (30, 70, 78 rpm) 7", 10", 12", 16"		

2017 ASA Audiovisual Preservation Survey and Assessment Report (Template 2)

Appendix D
Audio Visual Site Assessment : Detailed Inventory Questionnaire Template 2
Archive: _____ Date: _____

ID	Phonograph Record	#/ extent	Deterioration/Degradation: Physical - delamination, exudation, breakage, groove wear, pits, scratches, cracks, surface contamination (dirt, dust, mold) 1. Slight, 2. Moderate, 3. Heavy, 4 Extensive 5. unusable ID:
	Vinyl disc (also referred to as 'LP') 7", 10", 12"		

ID	Other	#/ extent	Condition: Degradation/Decomposition: 1. Physical: perforation damage, base/emulsion scratches, edgewear, splice damage, repairs, shrinkage, colour dye fading, b/w stock silver mirroring 2. acetate base deterioration, "vinegar syndrome" scale 0-3, nitrate decomposition scale 1-5, , fading, silver mirroring (b/w) 3. mold, fungus 1. Slight, 2. Moderate, 3. Heavy, 4 Extensive 5. unusable ID:
	Filmstrips		

Comments:

Appendix E: Benchmarks for Condition Inspection of AV Media

The approach taken for the condition inspection of the AV media during this survey, was limited to focusing on the most serious forms of deterioration, in order to determine those formats at the highest preservation risk. No playback of any AV media was carried out as part of this survey. The condition assessments were entirely based on visual inspection. No mold was found on any of the AV media sampled. Included in the inspections were the condition of the housing, and the storage methods used.

1. Motion Picture Film

- a. Deterioration on a scale of 0 (no deterioration) to 3 (critical):
 - i. Acetate base deterioration, “vinegar syndrome”
 - ii. Colour dye fading
- b. Mold, fungus
- c. Perforation damage, base/emulsion scratches, edge weave, shrinkage, splices, repairs, shrinkage, b/w stock silver mirroring. These conditions were noted on a scale of 0 (no degradation) to 5 (unusable), and relayed to the archive that they concerned, but were not included in an overall evaluation of the format for this report.

2. Magnetic Media

- a. Deterioration: oxide and backing shed, acetate based tape deterioration (“vinegar syndrome”)
- b. Fungus
- c. Tape wind integrity: spoking, popped strand(s), flange pack, edge damage. These conditions were noted on a scale of 0 (no degradation) to 5 (unusable), and relayed to the archive that they concerned, but were not included in in an overall evaluation of the format for this report.

3. Phonograph Discs

- a. Deterioration: plasticizer exudation and delamination.
- b. Fungus
- c. Scratches, pits, dirt (embedded and surface), cracks, breakage, warp, and wear. These conditions were noted on a scale of 0 (no degradation) to 5 (unusable), and relayed to the archive that they concerned, but were not included in in an overall evaluation of the format for this report.

Appendix F: Sampling Rates and Methods

12% of the total of the audiovisual holdings of the institutional members' archives were sampled.

Figure 10: AV sampling rates: Three Categories

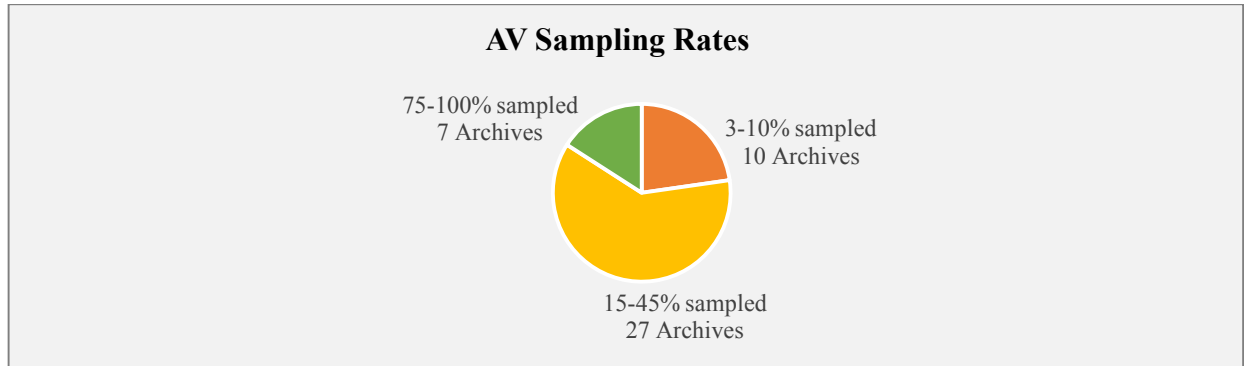


Table 20 is a breakdown of sampling rates and estimated number of audiovisual items in each archive.

TABLE 20: Sampling Rates and Total Percent and Number Sampled

# Archives	Total Estimated # AV Items	% AV Sampled	Estimated # AV Sampled
10	80,615	>1*-10%	3,531
27	39,773	15-45%	8,354
7	926	75-100%	789
	121,314		13,926

The estimated number of AV sampled was arrived at by calculating the % sampled at each archive and totalling them.

* One archive was sampled at 1% and 1 archive was not sampled, as the AV media was not available.

Clarification of Sampling Method

The overall, average rate of sampling in archives for this project was 12%. The rates per media type vary because the sampling rates varied according to the size of the individual archive's AV holdings. Generally, the larger the archive's audiovisual holdings, the lower was the percentage of media that was sampled. This was due to overall project timeframe and human resource limitations.

In terms of AV items that are presently suffering from serious deterioration, the number of deteriorated items represents the actual count from the on-site inspections in addition to numbers provided by the archives.

The number of items inherently at risk and those at high risk for obsolescence are the result of audiovisual counts provided by the individual archives through inventories, discussion with them, and on-site observation. These numbers are close estimates.

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GLOSSARY

This glossary provides a selection of basic definition of the frequently used terminology in AV discourse. In addition, included are terms that archivists during this survey frequently were unfamiliar with, having little or no training in AV conservation or the science that underlies it.

Audio tape

A magnetic band, belt or strip, composed of three parts base, binder or adhesive, and recording surface intended for the recording/playing of sound recordings. Made usually with a base material of polyester, but can be with paper or cellulose acetate. The recording surface is attached to the base with a binder or adhesive. The tape is pulled over a record or playback head to record/play a magnetic signal either analogue or digital. The most common speeds of audio tapes are 15-, 7½-, 3¾-, and 1#-IPS; see also cassettes; cartridges; magnetic tape; phonotape.¹

Audiovisual

Audiovisual documents are works comprising reproducible images and/or sounds embodied in a carrier whose recording, transmission, perception and comprehension usually requires a technological device.²

Back coating

A thin conductive coating applied to the magnetic side of magnetic tape to improve winding qualities.¹

Baking tapes

A process in which a magnetic tape is placed at an elevated temperature for a brief time in order to firm up the tape binder. This procedure is recommended as a temporary cure for the sticky shed or sticky tape syndrome.²

Batch

Materials (e.g., film, magnetic tape, etc.) manufactured at the same time and stamped with the same control marks (numbers, etc.), if the manufacturer uses such identifications, to indicate that each item has the same physical characteristics (e.g., tensile strength, colour, weight, thickness, light sensitivity, etc.).¹

Betamax

Sony's entry into the ½-inch consumer videocassette market that produced better quality video with stereo audio. The small cassettes could record over five hours at their slowest speed. However, the format was eclipsed in the consumer market by the VHS format. However, the BetaMax format proved to be a testing ground for several technical innovations in the professional market. It was improved upon and ultimately lead to the BetaCam format.¹

Cellulose acetate

as a safety film and magnetic tape base, and 4) as a coating on direct-cut lacquer discs. Although generally acknowledged as being the best base for magnetic recording medium for many years, it is an unstable medium with a limited storage life and has been replaced by polyester.¹

Cylinder

1) A hollow, tube shaped object. 2) The audio recording format invented and patented by Thomas Edison in 1877/78. Originally made of a sheet of tin foil wrapped around grooved metal (the signal was embossed into the foil), then wax, and later celluloid. Playing time lasted from two to four-plus minutes depending on the playback speed and threads or grooves per inch ... and the general dimensions of the standard cylinder were 4½-inches in length, 2¼-inches in external diameter....¹

Delamination

The loss of adhesion between layers of a multilayered item (i.e., cylinder, disc, film, tape); may be caused by such as poor fabrication, exposure to fungal attack, extremes of temperature and humidity, or the general ageing and deterioration of a product.¹

Deterioration

The gradual ageing and ultimate destruction of materials due to the action of chemical, biological, and physical processes.¹

Digital surrogate

Digital preservation or access copy.

Film

A generic term for a flexible strip of cellulose (usually nitrate, acetate or the newer polyester) which has a thickness in order of 0.125mm. ... Motion picture film has perforations along its length by the means of which it is driven through a camera, projector or other apparatus. One side of the film is coated with a layer of light sensitive emulsion or a magnetic coat. The record on the film may be photographic image, sound image, magnetic sound or a combination of these.²

Format

The physical format in which something appears... The order in which data is organized or recorded on a medium.¹

Gauge

The width of motion-picture film in millimetres.¹

Hydrolysis

... Decomposition in which a compound is split into other compounds by taking up the elements of water.¹

Hygroscopic

The tendency of a material to absorb water. Having the characteristic of drawing moisture from the atmosphere.²

Lacquer disc

(1932-1960's).

A recording disc, either single or double sided, made with a core of metal, glass, or fibre and coated with a lacquer compound, usually acetate or cellulose nitrate, into which grooves are cut; intended for instantaneous recording. Following the use of a wax master and until Direct Metal Mastering

became prevalent the lacquer disc was, also, the first step in the record production procedure leading to final pressed recordings. Before the introduction and acceptance of magnetic tape it was the most widely used form of instantaneous recording; also referred to as acetate disc.¹

Lacquer disc

Very occasionally lacquer discs were made with a water-soluble gelatin coating.

During the 1940s steel (very heavy) or glass cores (very fragile) were sometimes used. Cardboard has also been used as a core.

Usually the metal core or other core material of the disc can be identified by examining the centre hole.²

Magnetic particles

The magnetic particles incorporated in the binder to form the magnetic layer on a magnetic tape.

Iron oxide, chromium dioxide, barium ferrite, and metal particulate are various examples of magnetic pigment used in commercial tapes.²

Microfilm

Photographic film containing microimages. The term normally refers to roll film sufficiently long to be placed on reels, cartridges, or cassettes and retrieved by manual or automatic means. Images may be positive or negative and rolls may be 8-, 16-, 35- or 70-mm wide and up to several thousand feet long. Rolls can be cut to produce microfiche.¹

Microgroove

... A type of disc audio recording having 200 to 300 or more grooves per inch, suitable for reproduction by a stylus having a tip radius of 1 mil or less. Contemporary LP recordings are microgroove, as opposed 149 to 'coarse' groove for older 78-RPM discs.¹

Motion pictures

A series of still-images collected onto a flexible and transparent piece of film so that they can be projected in a rapid sequence so as to give the illusion of motion; also called cinefilm (Canada), cinematograph film.¹

Moving-image materials

A generic term for the range of physical forms upon which visual images, with or without sound, have been recorded or registered and which create the illusion of movement when projected, broadcast, or played back; includes flip cards, motion picture film, television, and video.¹

NFPA 40

The current standard in the U.S. for storage and handling of cellulose nitrate based motion picture film developed by the U.S.'s National Fire Protection Association as NFPA 40: standard for the storage and handling. This standard is used in Canada as well.¹

Oxide shedding

In magnetic tape recording, the loosening of particles of oxide from the tape coating during use, generally an indication of deterioration.¹

PEN

PEN stands for polyethylene naphthalate, a form of polyester that substitutes the terephthalate group for a naphthalate group. The result is a polyester that has a higher tensile strength than PET (polyethylene terephthalate) and a higher glass transition temperature (Tg) — 121°C for PEN, and 78°C for PET. The higher Tg enables PEN to offer higher dimensional stability at elevated temperatures.²

PET

Abbreviation for polyethylene terephthalate, the polymeric substrate material used for most magnetic tapes. Polyester is another material used to make safety base films.

Polyester was first developed in the late 1940s — the extreme resistance to tearing made polyester an ideal film base, able to withstand the rigours of commercial cinema projection. Since the early 1990s PET has become the base of release print materials.²

Plasticizer

An additive to materials which makes them more pliable. Examples are camphor and castor oil. The loss of plasticizer can lead to shrinkage or hardening of the coating, causing flaking and peeling.²

Polyester

A name for polyethylene terephthalate (PET) developed by E.I. Dupont de Nemours & Co (Inc.). A film base material exhibiting superior strength and tear characteristics.

Cronar is the trade name for Dupont motion picture products; *ESTAR* Base is the trade name for Kodak products.

Polyester when used as a film base has the same requisite properties as nitrate and acetate base: it is fully transparent, and is elastic. Besides, it has greater tensile strength. Compared to other bases it has decisive advantages: it is unaffected by temperature changes or humidity and does not release harmful gases.²

Polyethylene

A chemically inert, stable, highly flexible, transparent or translucent thermoplastic material. It is used in preservation as a protective liner or sleeve for discs and tapes. It furnishes a smooth fungi resistant surface and is also a moisture barrier for both the disc or tape and the external packaging (jacket or box). It has a low melting point and is also suitable for an enclosure for photographs when made with no surface coatings or additives.¹

Polypropylene

A stiff, heat-resistant, chemically stable plastic. Common uses in preservation: sleeves for 35-mm slides or films, containers for such as safety film, magnetic tapes.¹

Polyvinyl chloride

A plastic, manufactured since the 1930s, not as chemically stable as some other plastics, since it can emit hydrochloric acid (which in turn can damage archival materials) as it deteriorates. It, therefore, has limited application in the preservation of archival materials. Some plastics called vinyl may, in fact, be PVA. In the sound recording industry it is used in the manufacture of discs,

magnetic tape backing, and magnetic tape binder; it was used as a binder in 78-RPM shellac type discs, and is the primary ingredient in contemporary LP discs.¹

Quality control

The series of tests and measurements used to maintain acceptable tolerances -- for example, those of discs in mass production, or of transfer quality in preservation re-recording.¹

Relative humidity

The amount of water in the air relative to the maximum amount of water that the air can hold at a given temperature. The relative humidity (RH) is the ratio of the actual water vapour pressure to the saturation water vapour pressure at the prevailing temperature. ...

RH is usually expressed as a percentage rather than as a fraction. The RH is a ratio. It does not define the water content of the air unless the temperature is given. The reason RH is so much used in conservation is that most organic materials have an equilibrium water content that is mainly determined by the RH and is only slightly influenced by temperature.²

SSS- sticky shed syndrome: A class of polyester magnetic tape that has a back-coat, that exhibits deterioration of the binder through hydrolysis, exhibited by sticking, significant oxide shedding and squealing on playback.

SBS-UP – sticky binder syndrome: A class of polyester magnetic tape that does not have a back coat, that exhibits deterioration of the binder through hydrolysis, exhibited by sticking, little or no oxide shedding and squealing on playback.

Shellac phonograph disc

Date Range: c1897 – c1960

Shellac discs (commonly called 78s) are usually coarse-grooved, of 10 or 12 inches diameter and play at 78 rpm (revs per minute) with a duration of three to four minutes per side. They usually only have one track per side.

Five inch, eight inch, twenty inch and other sizes are occasionally seen and speeds can range from between 70 to 90 rpm.

Shellac discs are heavier and more brittle than vinyl discs.²

Vinyl

Date range: c1948 – to present (specialty usage by DJs)

LPs (Long Play), EPs (Extended Play), 45s (45 rpm) and singles (one track on each side) and radio transcription discs were commonly made from vinyl.

Vinyl discs are usually fine-grooved (microgroove), of seven, ten or twelve inches diameter and play at 33.33 rpm or 45 rpm. Sixteen inch radio transcription discs generally play at 33.33 rpm but are coarse-grooved. Ten and twelve inch radio transcription discs are usually microgroove. Some vinyl novelty records can be found that are other sizes.²

Video

A generic term used variously to describe the system for electronic representation of moving images, the electronic signal representing the images, the machinery for the recording, the replay of electronic moving images and the recording medium used.²

Vinegar syndrome

Vinegar syndrome is a term used to describe the chemical reaction that goes on during the deterioration of cellulose triacetate film support.

When cellulose triacetate begins to decompose, 'deacetylation' occurs and the acetate ion reacts with moisture to form acetic acid, producing a vinegar odor when the can is opened. The presence of the odor does not mean the film has degraded, but rather that the reaction is taking place. However, the reaction is continuous, and once started, it cannot be stopped or reversed. In fact, the reaction is autocatalytic, which means it feeds on itself and speeds up over time. The acid produced can also react with the dyes in colour films, causing dye fading and damage to both the image as well as the base.²

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<http://portal.unesco.org/ci/en/files/7746/10448729330glossary.pdf/glossary.pdf>

2 National Film and Sound Archive of Australia

<https://www.nfsa.gov.au/preservation/preservation-glossary#heading-glossary-a>

AV RESOURCE LINKS

AV Preserve

Includes strategy and solutions for digital preservation, digital asset management and access

<https://www.avpreserve.com/>

Audiovisual Archiving: Philosophy and Principles Ray Edmondson Third Edition 2016

<http://unesdoc.unesco.org/images/0024/002439/243973e.pdf>

Canadian Council of Archives

A decision tree for digitization

http://www.cdncouncilarchives.ca/digitization_en.pdf

Center for Home Movies

Step-by-step instructions for the process of preparing motion picture film for freezing

<http://www.centerforhomemovies.org/filmforever/chap8.html>

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<http://memoriav.ch/wp-content/uploads/2014/07/VARRFP.pdf>

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<https://www.nedcc.org/free-resources/preservation-leaflets/6.-reformatting/6.1-microfilm-and-microfiche>

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