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DESCRIPTION OF THE PROJECT AND ITS SIGNIFICANCE

The University of Texas at Arlington Library requests from the National Endowment for the Humanities' Sustaining Cultural Heritage Collections program the amount of $400,000 over a two-year period to support the construction of a cold storage vault to stabilize and preserve the photographic negatives in its Special Collections. Special Collections' photographic holdings constitute irreplaceable documentation of Texas culture and history and of the natural and built environments of the Dallas-Fort Worth Metroplex, the fourth largest metropolitan area in the United States. The largest and most heavily used collection in the repository is the photographic morgue of the Fort Worth Star-Telegram, a newspaper covering issues of national and international scope ranging from the only photographs of the 1947 Roswell UFO debris to images of John F. Kennedy's fateful trip to Fort Worth and Dallas in 1963. Numbering in excess of 5 million, UT Arlington's images are heavily used for a variety of purposes, from scholarly publications to family research to renovation of historic buildings. The negatives are at severe risk of imminent loss to accelerating deterioration, which has been documented amply by staff testing and multiple consultant surveys. Consultants have advised that cold storage is the most cost-effective means to preserve the negatives.

The photograph collections have been used extensively to support books, textbooks, articles, television programs, videos, websites, exhibits, educational classes, and presentations, in both academic and popular realms of endeavor. They often are used in projects made for national or worldwide audiences. Images from a broad spectrum of subjects have been incorporated into CBS News' 48 Hours; ABC-TV's 20/20; KERA-13 public television’s Living with the Trinity: The Trinity River in Dallas, Fort Worth, North Texas and Beyond; and a variety of PBS, Court TV, History Channel and Discovery Channel programming.

Images from the collections have been used to ensure historical accuracy in the renovation of buildings. They also grace the walls of numerous private homes and commercial spaces including restaurants, hotels, museums, stores, and office suites. These collections have enriched the public in general and UT Arlington's patrons individually, providing them with access to irreplaceable images that capture a visceral sense of history and community that would be impossible to achieve through only the written word. These photographs further the understanding of the human condition. Their role in support of the humanities has been, is, and will continue to be invaluable.

This project has the support of the University Provost, whose letter of commitment is appended. He, the Vice President for Research Administration, and the Library Dean all have agreed to waive their shares of indirect costs for the project, meaning that every dollar funded by the NEH would be applied directly to project costs and not to university overhead.

UT Arlington Office of Facilities Management personnel at the highest possible level are involved in this effort. They already have lent their expertise and time to the project by assisting with planning and they are poised to participate in the construction effort when funding is secured. Special Collections invested approximately $23,000 of its own funds (accumulated from years of receipts collected for the reproduction of images for researchers) to hire a consulting conservator and an advisor on vault mechanics to evaluate our circumstances and collections, select a vault location, guide our planning, and assist with the structuring of this proposal. Not least, Special Collections staff has over the years invested untold hours to analyze environmental conditions and the condition of collections materials in order to gather documentation to inform our decision making.

The requested funding would be used to build upon a solid foundation created by years of staff work and expertise, recent advice received from expert consultants, and the identification of an extremely suitable location for the vault. The proposed project start date is September 1, 2011; the ending date is foreseen to be August 31, 2013.
Introduction

Overview
The University of Texas at Arlington Library requests from the National Endowment for the Humanities' Sustaining Cultural Heritage Collections program the amount of $400,000 over a two-year period to support the construction of a cold storage vault to stabilize and preserve its photographic negatives. This project has the endorsement of the University Provost, whose letter of commitment appears in Appendix 6 (p. 193). In addition to his allocation of supporting funding in the amount of $164,111, the Provost, the Vice President for Research Administration, and the Library Dean all have agreed to waive their shares of indirect costs for this project, meaning that every dollar funded by the NEH would be applied directly to project costs.

The University's Office of Facilities Management is represented in this project at the highest level. They have lent their expertise and time to the project by assisting with planning and they are poised to participate in the construction effort when funding is secured. Special Collections invested approximately $23,000 of its own funds (accumulated from many years of receipts collected for the reproduction of images for researchers) to hire a consulting conservator and an advisor on vault mechanics to evaluate our circumstances and collections, select a vault location, guide our planning, and assist with the structuring of this proposal. The consultants made their site visit on April 16, 2010. Not least, Special Collections staff members have over the years invested untold hours to analyze the environment and condition of our collections materials in order to gather documentation to inform our decision-making.

Special Collections personnel have for years seen the critical need to improve the environmental conditions in which UT Arlington's photographic materials are held. In recent years, the urgency of the situation has become increasingly obvious. In 2008, Special Collections staff succeeded in impressing Library managers of this urgency, which resulted in the inclusion of a cold storage planning initiative on the Library's FY2009-2011 strategic plan (Appendix 2, pp. 151-152). The cold storage vault is the UT Arlington Library's top preservation priority. The history of this effort is discussed in more detail under History of the Project beginning on page 10. Excerpted material from the cold storage initiative's scope statement is to be found in Appendix 2 (p. 153).

Institutional Profile and Mission
The University of Texas at Arlington Library Special Collections specializes in historical materials relating to Texas, the U.S. War with Mexico (1846-1848), the cartographic history of Texas and the Gulf of Mexico, and Mexico from 1810 to 1920. It also houses the university archives and archival collections relating to Texas labor and politics. Its collections include more than 50,000 volumes, over 9,000 linear feet of manuscript and archival collections, an estimated 10,000 historical maps, more than 5,000,000 photographic prints and negatives, and thousands of items in other formats. UT Arlington's Special Collections form the premiere repository of photographs in the northern half of Texas and one of the largest in the nation. It is the repository of last resort for some research subjects not duplicated by other repositories in Texas or elsewhere.

Special Collections is a founding partner of Texas Heritage Online and a long-time member of Texas Archival Resources Online. Its staff boasts two recent presidents of the Society of Southwest Archivists (the Library Dean makes a third, creating a distinction held by no other institution), and the current Secretaries of the Texas Map Society and Texas Heritage Online.
Special Collections’ beginnings date to 1967 but the present facility was constructed in 1974 to house the Texana and Mexican War donations of collector Jenkins Garrett. At that time, the university archives and Texas labor and political collections were brought together administratively with the Garrett gift. In 1997, Virginia Garrett donated her personal collection of maps. Mr. and Mrs. Garrett and their children have been devoted supporters of UT Arlington for decades, making every effort to help the university and the library grow in stature and strength. Their support continues despite Mr. Garrett’s death in January 2010.

Special Collections has a permanent staff of nine FTE and, in addition, employs a number of students each semester and offers volunteer opportunities for individuals interested in assisting staff. Special Collections publishes a newsletter, The Compass Rose, twice a year and mounts exhibits relating to its holdings. It also hosts a well-regarded biennial lecture series, the Virginia Garrett Lectures on the History of Cartography. The 2010 lectures (the seventh in the series) were held as a joint event with the annual meetings of the Texas Map Society and the International Cartography Association, thus drawing a diverse and international attendance. The combined meetings offered 32 presentations over the span of six days.

In addition to UT Arlington students, faculty, and staff, Special Collections serves researchers from around the world. In fiscal (academic) year 2010, Special Collections served nearly 2,000 researchers (including remote users) and received almost 1,400 visitors on site. These researchers consulted nearly 7,000 items. Special Collections provided to researchers close to 2,000 digital reproductions of images (an increase of 20% over the previous year, continuing an upward trend established by increases of 56%, 37%, and 59% in FY09, FY08, and FY07). Special Collections staff answered 2,135 reference questions, more than half of them from people who didn't physically visit the premises, and cataloged more than 500 items. We received 176 gifts of library and archives materials, accessioned 354 print items, and accessioned 220 linear feet of archives/manuscript materials comprising 129 accessions.

Special Collections is part of the UT Arlington Library. The Library is comprised of seven physical locations and three electronic libraries. Special Collections is located on the 6th floor of the Central Library, which has 7 floors (including basement) and 201,040 square feet. Library staff numbers 112 excluding student employees. The Library has a 2010/2011 operating budget of $13,678,000; the acquisitions budget for FY2011 is $6,004,000 and the Maintenance & Operations budget is $1,800,000. The UT Arlington Library welcomed 1,766,450 users/visitors in the academic year ending August 2010.

UT Arlington is an emerging research university in pursuit of Tier One status and is located in the center of the Fort Worth/Dallas Metropolis. It is the fastest-growing campus in the University of Texas System, its enrollment increases having set records for two consecutive years. It is the second largest campus in the UT System and has an enrollment for the 2010 fall semester of just under 33,000 students. Its mission statement begins:

"The University of Texas at Arlington is a comprehensive research, teaching, and public service institution whose mission is the advancement of knowledge and the pursuit of excellence. The University is committed to the promotion of lifelong learning through its academic and continuing education programs and to the formation of good citizenship through its community service learning programs."

Special Collections supports the institutional mission by making our resources--both materials and people--maximally available to further the education of students and the research of faculty. We
pride ourselves on superior customer service and on doing everything possible to meet the needs of our researchers, who include many from the general public, commercial organizations, and institutions of culture and learning. Special Collections has an acquisitions budget for FY2011 of $68,500 plus approximately $40,000 dedicated exclusively to cartographic materials. Special Collections’ acquisitions decisions are guided by its collection development policy. This policy is midway through a total revision. The existing policy appears in Appendix 2 (pp. 154-162).

A state-of-the-art cold storage facility would enhance Special Collections’ profile as an institution that meets archival standards for its holdings. The provision of excellent storage conditions would better position us to draw future donations relevant to the mission of UT Arlington and the region in which it is located, following the successful precedent set by UT Austin’s beneficial impact on the UT system.

**Significance of Collections**

Special Collections’ photographic holdings constitute irreplaceable documentation of Texas culture and history and of the natural and built environments of the Dallas-Fort Worth Metroplex, the fourth largest metropolitan area in the United States. The largest and most heavily used collection in the repository is the photographic morgue of the *Fort Worth Star-Telegram*, a newspaper covering issues of national and international scope.

A particularly rich aspect of the collections is the visual heritage of Fort Worth, a city with national stature in the cattle industry (cattle ranching and the Fort Worth Stockyards), railroads, civilian and military aviation (birthplace of American Airlines; home of Convair’s bomber plant; Bell Helicopter; and Carswell Air Force Base, one of the first Strategic Air Command bases), communications (WBAP TV was the first television station in Texas), oil and natural gas, sports, and the arts. Citizens of Fort Worth have garnered national limelight over the decades, among them golfer Ben Hogan; baseball great Bobby Bragan; musicians Van Cliburn, T Bone Burnett, Bob Wills and the Light Crust Dough Boys, and jazz legend Ornette Coleman; and former Speaker of the U.S. House of Representatives Jim Wright.

Photographs have always been a vital component of Special Collections’ holdings. Initially, photographic materials were limited to those found nestled in manuscript and archives collections. In 1985, Special Collections acquired its first stand-alone photograph collection—the Basil Clemons Photograph Collection. In the intervening years, photographic holdings have grown exponentially and now comprise more than 5 million negatives in addition to well over 200,000 prints in more than 40 disparate collections. They range in date from the late 1840s to the present. Basically all formats, from daguerreotypes to digital files, are represented in the collections.

The largest and most heavily used photograph collections at UT Arlington are listed below. For purposes of this proposal, the physical extents given describe only the negatives in the collections that would be moved to cold storage and do not include prints.

- **Fort Worth Star-Telegram Collection**: 1920s-1990s, 4.8 million negatives. This collection is the morgue of Fort Worth’s largest newspaper. In addition to documenting a local and national perspective of the daily happenings around Fort Worth, Tarrant County and Texas for over 70 years, the collection contains a significant number of late 19th and early 20th century images, negatives documenting John F. Kennedy’s November 1963 visit to Fort Worth and assassination in Dallas, and the only known photographs of the 1947 Roswell
“UFO” debris. It also provides a pictorial record of the public and personal life of its founder and publisher, Amon Carter, (“Mr. Fort Worth”) an icon who played a national role in business, politics, communications, aviation, and philanthropy.

- **Squire Haskins Photography Inc. Collection**: 1949-1999, 436,000 negatives. Haskins was one of the premier aerial photographers in the Southwest. The collection documents the explosive commercial, industrial and neighborhood growth of the Dallas-Fort Worth area in the last half of the 20th century. It includes aerial, architectural, commercial, State Fair, and convention assignments, and an annual documentation of the Dallas skyline.

- **W. D. Smith Photography Negatives Collection**: 1941-1989, 190,000 negatives. Smith was Fort Worth’s finest commercial photographer and was known for his architectural photography. The collection’s major strengths are progress photos of local construction projects and a significant collection of 19th and early 20th century historic images.

- **UT Arlington photograph collections** (various): 1895-2009, 111,000 negatives. These collections comprise UT Arlington’s visual heritage, offering images of the faculty, staff, students and student activities, interior and exterior views of the campus buildings, and aerial photographs of UT Arlington and its predecessor institutions.


- **Jack White Photograph Collection**: 1960s-1994, 40,000 negatives. Images in the White Collection, both historic and contemporary, reflect the growth and development of Fort Worth from its early days to its emergence as a 20th century business and financial center.

- **Cirrus Bonneau/Ana Beaulac Photograph Collection**: 1977-1993, 8,000 negatives. Bonneau and Beaulac’s work is represented in a documentary photography collection focused on cemeteries in Texas, New Mexico and Mexico; Fort Worth buildings, streetscapes, events, and disappearing neighborhoods; and local wrestling matches.

- **Basil Clemons Photograph Collection**, 1919-1948, 4,500 negatives. Clemons’ images document the heyday of the 1920-1930s oil boom in Breckenridge and surrounding Stephens County, Texas. The collection also includes street scenes, schools, Wild West shows, circuses, church activities, schools, family portraits, ranching, and minority African-American and Hispanic subjects.

Taken together, images from our diverse collections comprise a rich visual record representing wide-ranging topics of interest to researchers in the humanities. Urban development, the growth of the American West, historic preservation, entertainment, popular culture, minority populations, and labor and political movements are but a few of the subjects whose study can be enriched by the resources in UT Arlington’s photographic holdings. Many more may be discovered by researchers yet to come.
Use of the Collections

UT Arlington’s photograph collections have been used to support both academic inquiry and popular culture pursuits. Our images have appeared in books, textbooks, articles, television programs, videos, websites, exhibits, educational classes, and presentations, enriching the public in general and our patrons individually by providing them with access to irreplaceable images that capture a visceral sense of history and community that would be impossible to achieve through only the written word. Their role in support of the humanities has been, is, and will continue to be invaluable.

Books solely or primarily illustrated with images from Special Collections include:

- Saxon, Gerald D. *Transitions: A Centennial History of the University of Texas at Arlington* (UTA Press, 1995)

Books partially illustrated with Special Collections photographs include:

- Martinez, Elizabeth. *500 Years of Chicana Women’s History* (Rutgers University Press, 2007)
- Sherrod, Katie (ed.). *Grace & Gumption: Stories of Fort Worth Women* (TCU Press, 2007)
- Unrue, Darlene Harbour (ed.). *Katherine Anne Porter Remembered* (University of Alabama Press, 2010)

Photographs from Special Collections have been the backbone of "Time Frames," a weekly feature highlighting Special Collections materials that has been published in the *Fort Worth Star-Telegram* since 2003. Selected "Time Frames" have for more than a year been available online as vodcasts ([http://library.uta.edu/spco/timeframes/main.html](http://library.uta.edu/spco/timeframes/main.html)). *Star-Telegram* reporters regularly use images from UT Arlington’s *Star-Telegram* archives for current writing projects. Images have been incorporated into journals such as *Theatre Design & Technology*, *American Jewish History*, *Legacies: A History Journal for Dallas and North Central Texas*, and *Landscape Architecture Magazine*; newspapers such as the *Fort Worth Weekly* and *Austin-American Statesman*; magazines such as *Fort Worth Magazine* (regular “Flashback” page), *True West*, and *Austin Monthly*; and internal publications such as Southwestern Medical Foundation’s *Perspectives*. 
Narrative

Special Collections’ photographic images are incorporated into bibliographic instruction provided to graduate and undergraduate UT Arlington students of history, architecture, and art history, among other disciplines. They also have been used in extended education classes at Texas Christian University on Fort Worth artists and sculptors and in a sequence of Fort Worth history and history of Fort Worth architecture classes. Special Collections staff worked closely with Arlington Independent School District teachers on an innovative student vocational marketing class project in which the students designed, manufactured, and sold a two-deck set of playing cards, one of which was illustrated with historical Arlington photographs from our collections. Photographs also have been incorporated recently into an iPad gallery tool and video, Dusty Days and Starry Nights – Cowboys and Cattle Barons, at the Sid Richardson Museum in Fort Worth. Extensive research has been done in the photograph collections to document wide-ranging topics such as the construction of freeways in the Dallas-Fort Worth area; for reports on historic buildings and neighborhoods impacted by a proposed public rail line; and to commemorate special anniversaries such as the 125th anniversary of the Fort Worth Club and the 75th anniversary of the Casa Manaña theatre. The collections are also in high demand by family historian and genealogists researching their family heritage.

Special Collections photographs are regularly incorporated into our exhibitions, notably the Spring 2008 The Reeder Children’s Theatre Presents... Memories of Fort Worth’s Reeder School and its American Library Association LLAMA “best of show” award-winning website (http://library.uta.edu/exhibits/spco/reeder/). Our images also have been included in exhibits in other venues such as the Old Red Courthouse Museum, Dallas; the Sixth Floor Museum, Dallas; the Amon Carter Museum, Fort Worth; the Fort Worth Independent School District; and the Fort Worth Museum of Science and History.

It is quite common for Special Collections’ photographs to be used in videos and television documentary films made for local, national or worldwide distribution. While use of the John F. Kennedy and Roswell UFO images are prominent in film productions, images from a broad spectrum of subjects have been incorporated into CBS News’ 48 Hours; ABC-TV’s 20/20; KERA-13 public television's Living with the Trinity: The Trinity River in Dallas, Fort Worth, North Texas and Beyond; and a variety of PBS, Court TV, History Channel, and Discovery Channel programming.

Finally, these collections are used in the regional/local community by businesses, individuals and organizations. Natural gas giant XTO Energy has made systematic use of our historic Fort Worth photographs in their nationally recognized restoration of nine downtown Fort Worth commercial office and industrial buildings. Special Collections photographs also are prominent in historic markers in downtown Fort Worth and in Arlington public parks as well as in posters in downtown Fort Worth bus shelters. Commercial businesses such as Albertson’s grocery stores and Wells Fargo Bank branches use our vintage photographs in store displays or wall-sized murals. Local heritage organizations such as the Fort Worth Jewish Archives and the Montague and Hays County Historical Commissions also have used Special Collections’ photographic resources for study and to enrich collections and exhibits.

Relationship to Collections Elsewhere

Special Collections is the major photograph repository in North Texas and one of largest in the nation. Its collections are unique and are a resource available not only to UT Arlington clientele but to patrons from the general public around the world. The Fort Worth Star-Telegram Collection is the only extant major newspaper photo morgue publicly available in a wide geographic area. It is
NARRATIVE

The photographic negatives currently are stored in substandard environmental conditions. Average temperature and humidity readings in Special Collections’ archives storage area over the last five years have been 70° F and 39% RH. Temperature has fluctuated between 65.59° and 74.53°; humidity has varied from 23.40% to 63.20%. Our 70° average temperature reading is two degrees higher than what the Image Permanence Institute’s IPI Storage Guide for Acetate Film (http://www.imagepermanenceinstitute.org/shtml_sub/acetguid.pdf) defines as room temperature and identifies as "likely to cause significant damage."

Inadequate control of temperature and humidity in storage areas already has caused physical degradation of negatives and threatens those not yet affected. Degraded negatives rapidly become unusable because the image-bearing layer separates from its carrier, meaning that an affected negative no longer will reproduce an undamaged image. Vinegar syndrome (defined at http://www.imagepermanenceinstitute.org/shtml_sub/glossary.asp#V) and other signs of physical deterioration have been documented in the Star-Telegram collection in negatives created as late as the 1950s and also have been observed in the W. D. Smith and Squire Haskins collections. Degradation is a problem in any collection, but because Special Collections’ negative holdings are so large the amount of degradation to be addressed is staggering. Photo conservator Sarah Wagner, in her August 2010 Preservation Report for the Negative Archives (Appendix 1, page 89) estimates that...
45% (2.025 million) of the *Fort Worth Star-Telegram*’s 4.8 million negatives are degrading. 2010 A-D Strip testing (Appendix 1, pp. 148-149) has indicated that all of the 1930s negatives (approximately 12,000) have reached the critical stage, where shrinkage and warping is imminent if not already visible, and should be frozen and reformatted immediately. In addition, 68.75% of the 1940s negatives (36,000) are in poor condition and are actively degrading, with freezing and copying recommended. As Wagner states (Appendix 1, p. 78), “At the current documented rate of rapid deterioration, assume 10-20% of the films 70-90 years old will become unusable in the next 5-10 years, and a similar quantity each decade going forward.”

Although rehousing negatives in individual acid-free envelopes or four-flap enclosures is traditionally recommended as best practice, probably 99% of the negatives remain housed in their original acidic manila negative envelopes as they arrived from the *Star-Telegram*. Highly acidic newspaper clippings reside inside the envelopes with the negatives. Visual documentation of the preservation problems described in this proposal may be found in Rebecca Elder’s Amigos site survey report conducted in 2005 (Appendix 1, pp. 112-141).

**Preservation Challenges Addressed by the Project**

An environment of inappropriate and fluctuating temperatures and humidity, along with storage in inappropriate materials, is shortening significantly the useful life of UT Arlington’s photographic research resources. It is estimated that prints exist for less than 5% of our negatives. Rehousing alone is unfeasible because of the size of the problem and would not be a complete remedy in any case. As advised by our consultants, construction of a cold storage vault is the most cost effective measure to address the storage, stabilization, and preservation of the negatives. It will ensure that they remain available for generations to come.

According to the *IPI Storage Guide for Acetate Film*, under current storage conditions (70°F and 40% RH), the time to onset of vinegar syndrome for a fresh triacetate negative is 50 years. At the same level of humidity, storage at 40° delays the onset of vinegar syndrome to 450 years, while lowering the storage temperature to 30° extends it to 1,000 years, clearly illustrating the beneficial effects of reduced storage temperatures. Even for the negatives that already exhibit signs of degradation, the *IPI Guide* indicates that the approximate time for the free acidity of the negatives to double would be reduced from 5 years (at 70°F/50% RH) to 110 years (at 30°F/50% RH).

Cold storage also retards deleterious chemical interactions between poor enclosures and photographs. Wagner notes that “Individual buffered paper enclosures do facilitate retrieval, organization, and physical control while providing some benefit at room temperature storage by separating acidic film from itself. [But rehousing] with buffered paper enclosures has negligible impact on the extended film base longevity compared to cold, dry storage.” Therefore “replacement of old "envelopes is not required with cold storage, saving substantial material and labor costs plus additional space needs/costs due to increased bulk." Special Collections staff estimated that rehousing the *Fort Worth Star-Telegram* collection alone would expand its size by 3 to 5 times and take an estimated 200 years to complete. Furthermore, Wagner states that the process of rehousing can have its own harmful consequences: “The act of re-housing does "air out" films with an associated short-term drop in acidity. BUT this also causes a well-known effect whereby the aired film spontaneously buckles and channels within hours of being removed from its original enclosure.

Wagner also discounts another preservation alternative for the negatives--reformatting through digitization or traditional duplication. “Replacement (reformatting) costs are exorbitant compared to long term maintenance in cold storage.” Using a cost of $20 per item per scan, Wagner estimates the cost of digitizing the entire *Star-Telegram* collection at $97 million over a 25-30 year period.
Even digitizing the older, more acidic 4x5 negatives from the Star-Telegram and other comparable collections (an estimated 520,000 negatives) would exceed $10 million and take at least 5 years, while segregating only the most deteriorated 50,000 to 100,000 negatives would cost up to $2 million and take at least 3 years. Consultant William Lull confirms Wagner’s assessment in his Consultation Report and Conservation Environment Program for New Cold Storage at the UT Arlington Library. In his “Fugitive Media Reformat Cost Analysis” coupled with his IPI Acetate Film Guide Analysis, Lull calculates the cost to reformat Special Collections’ negatives at $108,000,000 and estimates that the avoided wholesale reformatting cost afforded by the construction of a cold storage vault would result in an annual cost savings of $3,677,160 (Appendix 1, p. 38).

While digitization is not the salvation of the negatives, it is an important component of future access to them. Stabilizing the collections by instituting cold storage will permit them to survive until their digitization can be planned with greater effectiveness. It would ultimately enable a selective approach to digitization in conjunction with collection development priorities, program initiatives, and emerging research needs and interests. The time bought by stabilization of the negatives through cold storage will permit the development of creative initiatives and solutions such as a scan on demand approach wherein handling of negatives can be limited, both enabling preservation and providing a platform for a structured and phased approach to digitization.

Preventative Conservation Practices and Policies
Special Collections is located on the 6th (top) floor of the UT Arlington Central Library. The floor is inaccessible outside Special Collections’ business hours. Special Collections maintains a climate-controlled environment secured by locked doors and an alarm system monitored by the campus police department. Its doors were rekeyed during FY2009 to limit access to Special Collections staff, the Library Administrative Manager, the Dean of the Library, and Campus Police (who have only one key, obtainable only upon demonstrated need).

Environmental conditions in Special Collections have been monitored by HOBO dataloggers for nearly 20 years. Readings are captured every half hour and monthly reports are circulated to all Special Collections staff. UT Arlington’s on-campus remote storage facility has been rejected for photograph collection storage because of its high summer temperature and humidity readings. Overhead fire sprinklers are slated for installation on the 6th floor in 2014 and a disaster plan, although in need of updating, is in place.

The 1940s and 1950s negatives from the W. D. Smith Collection have been rehoused in mylar sleeves and acid-free envelopes and boxes with financial support from two NEH Preservation Assistance Grants received in 2001 and 2002. Similar work on the 1960s and 1970s Smith negatives is underway. Rehousing of the oldest Star-Telegram negatives into archival four-flap enclosures was begun but was suspended on our consultants’ admonition that such action could in fact accelerate the deterioration of the negatives (the airing-out effect). The Basil Clemons, Bonneau/Beaulac and processed Jack White collections are appropriately housed. Most of the Star-Telegram, 1960s and later W. D. Smith negatives, and all of the Squire Haskins and Arlington Citizen-Journal negatives remain in their original manila enclosures.

Researchers in Special Collections are required to register and to stow their personal items in a locker. Special Collections’ policy document Guidelines for Handling Special Collections Materials dictates that gloves shall be worn when handling photographs and outlines other points for the safe handling of materials. To minimize the amount of materials on tables and to avoid any transfer of materials between containers, only one box of prints or three envelopes of negatives are issued to a patron at any one time. Researchers are observed by Special Collections staff at all times.
NARRATIVE

Photographs are no longer photocopied in order to limit their exposure to light. Patrons may, however, order digital scans of desired images. Scans are retained by Special Collections so that they need not be repeated.

Level of Collections Control

Special Collections has title to and has accessioned all of its photograph collections. While the collections are vast, item-level access does exist for the majority of the negatives. Access to the *Star-Telegram* negative holdings is through the newspaper’s efficient original every-name index card file. Original access to the W.D. Smith negatives was through the photographer’s client index card file. The information for the 1940s and 1950s negatives has been transferred to a database and augmented with information present on the original envelopes and learned in the course of working with the collection. The 1960s and 1970s negatives are presently undergoing the same improvement of access. Folder level finding aids are available for prints in the Fort Worth *Star-Telegram* Collection and the Squire Haskins Collection and for both prints and negatives of the original accession of the Jack White Collection, the Basil Clemons Collection, and the Bonneau/Beaulac Collection. A database is under design for the Squire Haskins negatives. Subsequent accessions of Jack White negatives are grouped and arranged by subject but have no finding aid. The *Arlington Citizen-Journal* negatives are accessible only by date of publication.

The quality of existing intellectual control portends a smooth transition when moving Special Collections’ negatives to a cold storage vault. Negatives are accessed by identifying their unique number in a database, index card file, or finding aid and then proceeding to the location indicated by that number. Although the negatives will be rehoused (most from file cabinets) into acid free boxes, the existing search strategy will continue to be effective in the new storage. The relatively minor modification of creating a key or crosswalk to the new box numbers is foreseen, but this is envisaged to be merely an aid and not critical to access.

History of the Project

Previous Preservation Actions

Special Collections has demonstrated a longstanding concern for our photographic materials. Amigos consultant Steven D. Smith conducted a preservation site survey in June 1998 (updated 2001) that recommended a condition survey of the *Star-Telegram* collection, collections rehousing, negative duplication/reformatting, and cold storage. As a result, we reformatted 60% of our Fort Worth *Star-Telegram* glass plate negatives. In addition, we applied for and received two NEH Preservation Assistance Grants (2001 and 2002) to rehouse negatives in the W.D. Smith Commercial Photography Collection and continued working on this project after NEH support ended. The degradation of the *Star-Telegram* collection has been measured with A-D strips five times between 2004 and 2010 (Appendix 1, pp. 142-149). This testing confirms that the condition of 1930s negatives is critical, that 69% of the 1940s negatives are poor or approaching poor, and that degradation of the negatives is progressing into 1950s era materials. A second Amigos consultant, Rebecca Elder, did a site survey in 2005 (Appendix 1, p. 112) and noted that “preservation activities in the Special Collections include processing, maintaining a good environment, staff and user education, disaster planning and security” and that Special Collections was “very interested in the future possibility of cold storage.” Her recommendations included rehousing, digitization/reformatting, and cold storage. Following Elder’s report, Special Collections staff drew up plans to rehouse the Fort Worth *Star-Telegram* Collection and carried out a trial project. The effort yielded an estimate of 200 man-years needed to carry out the rehousing of negatives and the transfer of descriptive data to a database.
Special Collections has long understood the need for cold storage to retard the deterioration of our early photographic negatives. Staff members have over the years attended a variety of continuing education offerings to improve our ability to manage our photographic collections (further elaborated in appended resumes), including the George Eastman House/IPI weeklong *Preserving Photographs in a Digital World* and the Conservation Center for Art and Historic Artifacts’ *Focusing on Photographs: Identification and Preservation*.

**Strategic Planning**

The enormity of our collections plus the fact that the negatives are heavily used on a daily basis means that household-sized freezers are not the solution—a room-sized cold storage vault is a must. In 2008, pursuit of cold storage for Special Collections negatives was incorporated into the UT Arlington Library’s 2009-2011 Strategic Plan. The strategic planning team augmented information already accumulated by Special Collections staff by conducting six site visits to existing negative cold storage vaults in Texas and Canada and interviewing colleagues in the U.S. and Canada who had or were undergoing the process of designing or building a cold storage vault to house photographic collections. In April 2010, consultants Bill Lull and Sarah Wagner visited our Library to view prospective vault sites, assess the collections and environment, and meet with Special Collections staff, the Library Administrative Manager, the Dean of the Library and high-level UT Arlington Facilities Management personnel. Special Collections’ photograph preservation fund was tapped to pay the consultant fees to avoid further delay that would result from seeking planning grant funding. The consultant reports, appended to this application, made us aware of how we can best achieve our aim to extend the life of our negatives to the maximum and position UT Arlington to move forward at last toward the actual construction of a cold storage vault.

The key points made in the consultants’ reports are:

- **Cold storage is the most cost-effective preservation strategy for the UT Arlington black-and-white and color film archives.**
  - Costs to reformat UT Arlington negatives by digitization or traditional duplication would exceed $3 million per year and can be averted.
  - Rehousing film collections in archival enclosures will not be required, saving substantial material, labor and storage costs.
  - Cold storage will dramatically retard the deterioration of the negatives and allow time for selective digitization to proceed in a carefully planned fashion in targeted phases.

- **The UT Arlington cold storage vault should be comprised of two vaults and an office space.**
  - **Office**: Room temperature conditions to be maintained at 65-68°F and 30-40% RH.
  - **Vault A (Intermediate Cool Storage)**: Temperature is to be maintained at 55°F with relative humidity of 30-40% (time-weighted 35%).
  - **Vault B (Cold Storage)**: Temperature will be time-weighted 35°F; relative humidity will range between 25-35%, with time weighted average at 30% RH.
  - The ideal location for the vault is Rooms B05 and B06 in the basement of the Central Library building.

- **UT Arlington should retain the services of a registered architect and/or professional consulting HVAC engineer to design the project.**
  - The project should provide cooling, humidification, positive dehumidification, fine particulate control, effective air distribution, good system operation and reliability, and control of gaseous pollutants.
  - Architectural, lighting and plumbing characteristics in the design specifications will complement the environmental goals of protecting the collections.
The consultants’ reports were received only as recently as August 31, 2010. They immediately were distributed to project team members. Since receipt of the reports, UT Arlington members of the project team have met to discuss the consultants’ recommendations and begin work on this proposal. (Project team members are listed beginning on page 18. Both the Library and the Office of Facilities Management are thoroughly represented on the team. All UT Arlington staff members listed as team members and both consultants participated in planning and will continue to be involved in implementation.) Communication with the consultants has been ongoing and has informed the preparation of this proposal. The Library’s development officer has been consulted about fund-raising possibilities and the Library Dean has obtained from the University Provost financial support for this project. The Library strategic planning cycle is nearing its end and calls for further strategic statements have not yet been made. Reporting to the Library Management Team on ongoing activities concerning the cold storage strategic initiative continues at regularly scheduled intervals.

**Rationale and Outcomes**

Why cold storage, and why now? Construction of a cold storage vault is a viable, economic solution to stabilizing and prolonging the life of UT Arlington’s irreplaceable negative collections. The primary points of rationale, elaborated elsewhere in this proposal, are summarized here:

- UT Arlington Library photographic negative collections are an irreplaceable hard asset.
- Current environmental “room temperature” conditions are substandard and contribute to the deterioration of the negatives.
- A-D Strip testing told us that the degradation of our negatives was greater than feared.
- Calculations demonstrated that rehousing negatives is prohibitively expensive and time-consuming and is not the best solution.
  - Consultant Wagner stated that in cold storage harmful image interactions from poor-quality enclosures are greatly retarded, thereby mitigating the need to rehouse film collections in archival enclosures and saving substantial material, labor and storage costs.
  - Wagner also noted the “well-known effect whereby the aired film spontaneously buckles and channels within hours of being removed from its original enclosure.”
- Reformatting by digitization or traditional duplication would be exorbitantly expensive in dollars and in time.
- Cold storage will dramatically retard the deterioration of the negatives and allow time for selective digitization to proceed in a carefully planned fashion in targeted phases.

Consultant Lull stated in his report: “At a conservative value of over $3 million per year [in reformatting costs], a cold storage vault ... is clearly justified for these holdings... Clearly the Library is not prepared to undertake the reformatting otherwise necessary to recover from collections loss with or without cold storage, but the cold storage will keep these collections viable as an information resource for a longer period of time. Buying that time may also provide the opportunity for other technologies or funding to preserve the collections further.”

Extending the life of these negatives will support and enable the production of scholarship, exhibits, and publications far into the future. Given UT Arlington’s proven track record in providing educational resources to teachers and students, the resources preserved by funding this project can continue to serve as a springboard for new curriculum development efforts and to meet the expanding needs of researchers well into the future.
Methods and Standards

Research and Professional Standards that Inform the Project
Much of the research incorporated into this proposal is based on work done by the Image Permanence Institute (IPI), a non-profit university-based laboratory devoted to preservation research (particularly collection storage environments and the preservation of photographic images). IPI publications consulted by the project team include the *IPI Storage Guide for Acetate Film* and *IPI Storage Guide for Color Photographic Materials*. The project team also consulted International Organization for Standardization (ISO) standards for photographic film (ISO 18911), photographic prints (ISO 18920), photographic plates (ISO 18981), photographic activity test method (ISO 18916), filing enclosures and storage containers (ISO 18902), polyester base magnetic tape (ISO 18923), optical disc (ISO 18925) and mixed media archives (ISO 18934), as well as the National Information Standards Organization (NISO) standard for paper (NISO TR01-1995). National Park Service (NPS) cold storage vault specifications have been appended to both consultant reports and various issues of NPS *Conserv-o-Gram* newsletters have been referenced on topics ranging from storage of nitrate film to vapor-proof packaging for storing collection materials in household-type freezers. The environmental conditions selected for the UT Arlington vault conform to those used by the National Archives and Records Administration and required for federal archives in its Code of Federal Regulation (36 CFR 1228.232 (b.) Subpart K, September 2005) *Facility Standards for Records Storage*.

In preparation for a cold storage project, members of the Special Collections staff conducted a thorough search of the professional literature and attended classes and workshops on photograph preservation including the George Eastman House/IPI *Preserving Photographs in a Digital World* and Conservation Center for Art and Historic Artifacts’ *Focusing on Photographs: Identification and Preservation*. Site visits were made to cold storage vaults at the Amon Carter Museum, Fort Worth; the Harry Ransom Humanities Research Center at the University of Texas at Austin; the Lyndon B. Johnson Presidential Library, Austin; the Austin History Center; and the Vancouver B.C. City Archives. More than twenty colleagues across the United States and Canada were surveyed for information on their cold storage design and construction experiences and recommendations for cold storage consultants.

We learned that the condition of UT Arlington Special Collections’ photographic negatives is by no means unique. The benefits of using cold storage for the preservation of film negatives and color prints have been documented in professional literature for over twenty years. Cold storage vaults have been constructed by national institutions (Library of Congress, the Library and Archives Canada, the National Archives, National Library of Medicine, and the National Park Service), universities (University of California at Berkeley Bancroft Library and the University of Texas Harry Ransom Humanities Research Center), governmental archives (Delaware State Archives and Vancouver B.C. City Archives), public libraries (New York Public Library), and art museums (Amon Carter Museum, Fort Worth; Modern Art Museum, New York; and Seattle Art Museum).

Proposed Methods and Sustainable Strategies
Once funds are obtained, Special Collections will begin the process to design, bid, and construct a cold storage vault designed to operate at environmental conditions outlined below. Special Collections film negatives will be moved to archival boxes in preparation for relocation to the vault when construction is complete and vault operation has been tested. Boxes containing mixed acetate and nitrate negatives suffering severe deterioration will be wrapped in vapor-proof packaging and moved into free-standing freezers. The size of the vault is being designed to accommodate current film collections and to provide for future acquisitions. By moving our film
negatives to cold storage conditions, we will have extended their physical and research life for hundreds of years.

Our two consultants, Bill Lull and Sarah Wagner, are nationally recognized in this arena. The programming contained in their respective reports reflects state-of-the-art best practices and standards and will take us to the next phase of our journey to preserve our film resources—the construction of our vault. The Lull report discusses in great detail the mechanical equipment required for operation of a cold storage vault (Appendix 1, pp. 40-63). The design and operation of the vault will include complex mechanical systems including those for room conditioning, temperature and humidity control and monitoring, air filtration, security, and fire detection.* Final specifications will be determined by the architect, engineer, and vault designer, in consultation with UT Arlington facilities management personnel and Library staff. The layout of the vaults, showing the mobile shelving, is attached in Appendix 4, p. 175. The Spacesaver design is based on Wagner's Option 2 (Appendix 1, p. 83).

The vault layout is planned to have three sets of environmental conditions:

- **Office**: Room temperature conditions will be maintained for this space at 65-68°F and 30-40% RH. (Wagner email dated 11/8/2010)
- **Vault A (Intermediate Cool Storage)**: Temperature is to be maintained at 55°F with relative humidity of 30-40% (time weighted average at 35% RH). (Appendix 1, p. 44)
- **Vault B (Cold Storage)**: Temperature will be time-weighted 35°F (per Wagner email dated 11/21/2010); relative humidity will range between 25-35%, with time-weighted average at 30% RH. (Appendix 1, p. 41)

Although colder conditions could extend film life even more, such conditions come at a much higher initial cost and higher ongoing energy costs and usage. The consultants and professional staff from UT Arlington's Office of Facilities Management all agreed that the above selected climates would dramatically extend film life while allowing the university to meet state and federal mandates for energy consumption and environmental sustainability (to the extent possible with this energy-intensive preservation environment) and that by adopting the selected conditions a more energy-efficient vault could be constructed based on current engineering principles and equipment design that could more easily be maintained and sustained financially over its life cycle.

According to standard protocols of UT Arlington’s Office of Facilities Management, routine and preventative maintenance will be provided to ensure the equipment is functioning optimally. This also will maximize its energy efficiency. The specification will incorporate and require features such as Energy Star rated equipment, where available, and life cycle cost projections of vendors' proposed equipment and designs. The layout of the vaults, with a sequence of rooms of consecutively cold climates, will also minimize extremes of different climates interacting with the associated loss of cold air and increased energy load needed to restore the climate. This design may also allow for colder spaces to assist in the cooling of the adjacent warmer areas.

*Per Lull, "due to the risk of freeze-up, if an automatic fire suppression system is used, it should be a dry-pipe or pre-action sprinkler system." UT Arlington’s Vice President for Environmental Health & Safety Robert Smith, who serves as the university’s fire marshal, advised 11/24/10: "The vault would be best served at minimum with a double interlock pre-action wet sprinkle system. Other requirements would also require fire alarm detection with cross zoning as well as a manual releasing pull station. Fire alarm notification with interface to the building’s main fire alarm system will be required. Exit lights along with emergency lights would be required."
Ongoing Management and Monitoring of Conditions, Energy Consumption, and System Performance

Monitoring environmental conditions within the cold storage vault is essential in order to quickly detect deviations from operating norms. The vault will be equipped with temperature and humidity monitors that will signal an alarm when readings vary from equipment settings. Protocols for out-of-range alarms were established during the consultants’ April 2010 site visit. They set acceptable tolerances in temperature and humidity and identify who is to be alerted and when the vault would be shut down. The vault panel equipment will interface with the UT Arlington campus Siemens network and will be monitored 24 hours a day, seven days a week by personnel in UT Arlington’s Office of Facilities Management. OFM will alert Special Collections personnel when appropriate, and Special Collections’ procedures will incorporate checking equipment readouts when visiting the vault.

The operation of the cold storage vault will require ongoing vigilance. High-level UT Arlington facilities management personnel have been and will continue to be integral to the planning, construction, and maintenance of the cold storage vault. They have committed to operate, maintain and monitor the vault on an ongoing basis and to assign designated personnel to the vault for continuity of operations (Appendix 6, p. 194). The Library Dean supports the project and is aware that the Library budget will have to cover the vault's operating costs.

Garrison/Lull has proposed future work to, among other services, "prepare a ‘Users Guide’ to help the Special Collections staff and the campus facilities people know how to use and monitor the vault for the best performance and reliability." UT Arlington facilities maintenance personnel are very experienced in operating and monitoring special environments and expect the integration of the vault into their routine to be perfunctory. Active monitoring of vault readouts will be integrated into the job description and routine of the LAIV Photographs (Spitzenberger). Hodges, McClurkin, and Spitzenberger will write policies and procedures to document the necessary changes in how vault materials are accessed.

Impact of Proposed Environmental Improvements on Structure

The UT Arlington Central Library was built in 1964, with floors 3 through 6 added in a 1967 addition. It presently has six levels above grade and one level below grade. The location for the proposed cold storage vault is Room B05 and part of Room B06 (see basement floor plan in Appendix 3, p. 164; Wagner’s vault layout options 1 and 2 in Appendix 1, p. 83, and Spacesaver shelving design drawing in Appendix 4, p. 175). This space is in the northwest corner of the basement contiguous to the north and west exterior concrete basement walls and to an existing mechanical room. No structural columns or floor decking will be affected. The construction of the vault will require the removal of existing shelving, removal and rebuilding of non-structural walls, and expansion of the mechanical room.

The Library is currently undergoing renovations to address life safety issues. This includes adding new sprinkler systems, new lighting, new ceilings and grids, painting, and other associated work. The basement may be the floor scheduled for renovation during Summer 2011 which would dovetail nicely with the schedule slated for this proposed cold storage vault.
Work Plan

The project work plan consists of the following ten areas of activity. The timeline for bidding and construction was estimated by Harrison. Bidding is expected to occur in stages, hence the non-contiguous areas on the timeline and also the overlap in Year 1 of bidding and construction.

**Work Area 1. UT Arlington account setup.** University financial personnel set up accounts and payables to receive and disburse project funds.

**Work Area 2. Confirm funding sources for non-NEH funds.** Hodges, Library Dean, and Library Development Officer line up additional funding needed for the project.

**Work Area 3. Prepare for bidding.** UT Arlington’s Office of Facilities Management (OFM) staff will contract with a professional engineering firm to obtain the plans and specifications needed to obtain bids.

**Work Area 4. Bid work.** Bid package will be completed by OFM and bid.

**Work Area 5. Prepare vault site for construction.** UT Arlington’s Office of Facilities Management (OFM) staff will prepare vault site for construction. Research materials presently housed in the basement room that is to serve as the location for the cold storage vault must be relocated. This will be done under the careful supervision of Special Collections professional staff. The materials consist primarily of bound periodicals, atlases, and county records volumes. The periodicals easily can be identified and tracked through the Library catalog, and the collections of atlases and county volumes each are listed in a database. These forms of access will both identify the materials to be moved and, in the case of the catalog, be the vehicle for updating their locations. Catalog records will be updated by the Special Collections cataloger and LAIII to reflect the new locations of the materials. Personnel from UT Arlington’s Central Receiving department will dismantle the existing shelving in the room. Contractor personnel will clean the area.

**Work Area 6. Prepare materials for move into vault and craft written policies and procedures governing access to materials.** Special Collections staff supervised by Spitzenberger will transfer negatives from file cabinets into acid-free boxes and will document references to new box numbers to facilitate locating materials when they are requested. Hodges, McClurkin and Spitzenberger will write policies and procedures to educate patrons and staff of changes and to document the necessary changes in how vault materials are accessed. Boxes containing mixed acetate and nitrate negatives suffering severe deterioration will be wrapped in vapor-proof packaging and placed in free-standing freezers as soon as possible to stall further degradation (Appendix 1, p. 84). During the wrapping process, ambient humidity levels must be below 50% RH (Appendix 1, p. 106). Because the relative humidity in our work area often exceeds the recommended level, a dehumidifier will be purchased in order to ensure that ambient conditions are appropriate during the packaging process. The freezers will be located in a Special Collections work or storage area until the cold storage facility is complete. At that time, the acetate materials will be transferred into the cold storage vault. The freezers will be moved to the cold storage office and used to store Special Collections’ estimated 4,900 nitrate negatives.

**Work Area 7. Construction work to complete project.** OFM and professional engineers will ensure all work meets plans and specifications to provide a complete and usable project.

**Work Area 8. Purchase and installation of vault shelving and office furniture.** Hodges and Dolan will purchase shelving and furniture. Shelving installation is to be done by the shelving vendor. Furniture installation will be done by staff from Central Receiving.

**Work Area 9. Vault testing and preparation for occupancy.** The vault will be commissioned to follow ASHRAE Guideline G-1, including the following systems: security, refrigeration, general and
panel construction, doors, fire detection, fire suppression, controls, alarms, and failure/shutdown sequences. HVAC will be tested and balanced by a certified test and balance engineer to confirm that the installed system delivers the supply air as designed. The vault system will be operated continuously to allow the systems and spaces to stabilize. Special Collections staff will observe environmental monitoring data to ensure that readings are within desired criteria for an extended period covering a season when the dehumidification function will be operating (March-October).

**Work Area 10. Move materials into vault.** Special Collections personnel and student assistant workers will move the materials into the vault after completion of its construction and testing. This work area is not reflected in the timeline below because it is not expected to occur within the scope of the construction project itself.

**Timeline**

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<th>Activities</th>
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<tr>
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<tr>
<td>funding sources for non-NEH funds</td>
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<td>prepare for bidding (design)</td>
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<td>bid</td>
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<td>prepare site</td>
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<td>prepare materials for move</td>
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<tr>
<td>construction work</td>
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<tr>
<td>purchase/install shelving and furniture</td>
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<td></td>
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<tr>
<td>vault test and occupancy prep</td>
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**Areas of Responsibility Identified in Draft Design Budget** (not appended)

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<th>Responsible Person (UTA personnel unless *)</th>
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<td>General Construction (General Const)</td>
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<td>EH&amp;S/Schirmer</td>
<td>Robert Smith/Schirmer*</td>
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<td>Siemens/EAB</td>
<td>Kelly Baxley*/Harley Clines*</td>
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<td>Generator Connection</td>
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Project Team

**Leonard A. Bode**, University Air Conditioning Supervisor, is responsible for Campus Refrigeration Management, Facilities Construction Inspection, and Environment and Safety issues relating to campus HVAC. He has 31 years of increasing experience and responsibility in campus mechanical, utilities, maintenance and operation of facilities, environmental, and construction. He is responsible for operating and maintaining all HVAC and refrigeration-related equipment in UT Arlington’s 108 buildings. He developed and implemented UT Arlington’s Refrigerant Management Policy in accordance with the Environmental Protection Agency’s Clean Air Act, Title IV. Mr. Bode’s professional expertise will be employed on the project to ensure proper design, installation and functioning of the cold storage vault system. He participated in planning meetings with the project consultants in their April 2010 visit to campus and lent his knowledge to their analysis.

**Carleen Dolan**, Administrative Manager at the UT Arlington Library, has served the UT Arlington Library for 17 years. Prior to becoming Administrative Manager in 2006 she held the positions of Facilities and Procurement Manager (1996-2006) and Administrative Assistant (1993-1996.) Ms. Dolan is the Library’s liaison with the Physical Plant and Facilities departments at the university and coordinates the Library’s interactions with those departments and with contractors. She has overall responsibility for the maintenance of the physical condition of seven physical library locations and for the Library’s maintenance and operations budget. She coordinates all Library remodel and building projects and directs the Library’s bidding and procurement activities. Ms. Dolan will fill a coordinating role in the construction of the cold storage vault, working with all parties involved in the effort.

**Larry G. Harrison**, Director of the Office of Facilities Management, is responsible for the policy, programs, and execution of managing the UT Arlington physical plant, including construction, renovation, repairs and maintenance of all utilities systems, structures, and environmental functions. He has developed, defended, and executed the facilities budget in excess of $650 million annually and operated a physical plant valued at over $6 billion. He has managed physical plants from 2.5 to 15 million square feet of facilities space. Mr. Harrison is responsible for construction and capital outlay programs that have ranged from $11 million to over $650 million annually. He has 43 years of increasing experience and responsibility in managing engineering, environmental, and safety organizations involved in maintenance and operation of facilities and utilities systems and directing master planning, design, and construction. He has financial and executive-level management experience including first-hand dealing with building codes, leases, architect-engineering firms, and environmental, safety, and construction contractors. Mr. Harrison will direct the university’s interactions with architects, engineers, and contractors to ensure that the cold storage vault is designed and constructed in accordance with the Library’s needs and the university’s requirements.

**Ann E. Hodges**, MLS, MS, CA, will hold administrative responsibilities for the project. She will prepare and submit reports required by the funder and will work closely with UT Arlington staff as they prepare the negatives for rehousing and relocation and ready the existing space for construction. Ms. Hodges has been the Special Collections Program Coordinator at the UT Arlington Library since 2003 and has been employed there in other professional capacities since 1996. Ms. Hodges directs the operations of Special Collections, is a member of the Library’s management team, and chairs the Library’s strategic planning team for cold storage. She has served as project manager and administrator for several grant-funded projects and presently directs UT Arlington’s...
participation in the NEH-funded project "Mapping the Southwest," in which the University of North Texas is the recipient of funds to digitize UT Arlington maps.

**William P. Lull** of Garrison/Lull Inc. served as a consultant in UT Arlington's planning for construction of a cold storage vault and in the preparation of this proposal. His report is appended and is referenced in this proposal. It is envisioned that Mr. Lull will continue to advise UT Arlington’s efforts through the development, construction, and implementation stages of our project by providing some, although perhaps not all, of the following services: evaluate and comment on design engineer's work, evaluate and comment on vendor design submittal, make site visit and meetings to observe and discuss the vault installation, make site visit to evaluate the construction before final acceptance, and prepare a users’ guide to help personnel in Special Collections and OFM use and monitor the vault for the best performance and reliability.

**Brenda S. McClurkin**, MLS, CA, has served as Historical Manuscripts Archivist in Special Collections since October 2002. She is responsible for the oversight and care of photograph collections as well as collections of personal papers and business and organizational records. She is a member of the Library's cold storage strategic planning team and conducted much of its initial research on the topic, including conducting the A-D Strip testing of Special Collections negatives. Her role in the construction and implementation of the cold storage vault is to oversee and organize the preparation of negatives for placement in the vault, to plan for access to the negatives during transition and after they are placed in the vault, to document policies and procedures relating to access, to communicate changes to patrons, and generally to assist the Program Coordinator and project team with the execution of the project work plan.

**Nicholas Schroeder**, Campus Facilities Engineer, graduated with a BS in mechanical engineering from the University of Texas at Austin in 2004. He went to work as a consulting engineer with Jacobs/Carter-Burgess in Fort Worth, where he concentrated on HVAC, energy/power, and plumbing systems design and analysis, primarily for large healthcare, laboratory, and datacenter clients and projects. Mr. Schroeder, a registered Professional Engineer, joined UT Arlington as its Facilities Engineer in 2008 and supports a wide breadth of campus projects and initiatives.

**Cathy Spitzenberger**, MA, MLS, has been employed at the UT Arlington Library for nearly eight years. As LAIV Photographs she is charged with care of the photographic collections and works closely with the public to provide research access to and reproductions of photographic images. She is a member of the Library's strategic planning team for cold storage. Her role in the construction and implementation of the cold storage vault is to carry out, with the assistance of student workers and oversight by the Historical Manuscripts Archivist, the preparation of negatives for placement in the vault. She also will assist with planning for access to the negatives during transition and after they are placed in the vault, with documenting policies and procedures relating to access, and with communicating changes to patrons. The training she has received relating to photograph collections is listed in her attached resume.

**Sarah Wagner**, principal of Sarah S. Wagner LLC, served as consulting conservator in UT Arlington’s planning for construction of a cold storage vault and in the preparation of this proposal. Her report is appended and is quoted throughout. It is envisioned that Ms. Wagner will continue to advise UT Arlington’s efforts through the development, construction, and implementation stages of our project by conferring and advising regarding plans and specifications and making periodic site visits during construction phases and the move of the collections into the vault.
**Project Results and Dissemination**

The primary expected outcome of this cold storage vault construction project is the arrest of the deterioration of Special Collections' negatives and the extension of their useful life for hundreds of years. By ensuring the availability of these resources to generations of future researchers UT Arlington strengthens its contributions to work in the humanities by a measure unparalleled by any other action that could be undertaken.

The many users of Special Collections' photograph resources are accustomed to prompt and thorough access to the collections. Implementation of cold storage will necessarily require that materials removed from cold storage be allowed a period of acclimatization. This will require adjustments to the procedures to be followed when accessing the collections. It will be important to alert patrons to the coming changes and to educate them about the importance of cold storage, the reasons for the changes in access procedures, and the effects it will have on their plans for research. Special Collections will plan and undertake a program of informing researchers of the project and its ramifications. We will prepare signage to be placed in the reading room and elsewhere in the library and we will produce and distribute informational materials on site, through correspondence of all forms, and on our web site. We already encourage patrons to make appointments, especially when their projects are large and complex, but do not require it. After implementation of cold storage, appointments will be mandatory or patrons either will have to wait until the materials can safely be brought to them or will have to return at a later time. Reporters and other staff of the *Fort Worth Star-Telegram* will be most heavily affected because their work is of a very time-sensitive nature and requires quick access to the negatives. We plan to prepare specialized explanations and instructions for them, including meeting with them to educate them and giving them tours of the vault. Our close working relationship with them, not to mention their long-standing expectations of us, demands that we make special efforts to ensure that they understand the need for our transition to cold storage and its associated procedural changes and that they willingly cooperate with and support those changes. The proximity of an office to the vault, maintained at a climate to avoid condensation on negatives staged in the cool vault, should facilitate access by time-sensitive researchers.

Project information will be disseminated in various forums to reach intended audiences. Presentations about the project will be submitted to conferences and professional meetings such as the Society of American Archivists, the Society of Southwest Archivists, Metroplex Archivists, the Texas Library Association, and the Texas State Historical Association. Articles will be submitted to appropriate professional publications such as *Archival Outlook* and *The Southwestern Archivist* and will be published in Special Collections' newsletter, the *Compass Rose*, and the Library's newsletter, *Library Notes*, as well as in other university publications such as "MavWire," a daily electronic news release. Information about the project will be distributed through Special Collections' website and through publicity pieces distributed through UT Arlington's Office of Public Affairs and through appropriate professional networks. It will be shared with interested collaborative or consortial entities such as the Phoenix Network of libraries in North Texas, a group focused on the sharing and exchange of ideas and information for the mutual benefit and strengthening of all academic libraries in the region.
This project to construct a cold storage vault has received no previous support from any federal or nonfederal sources.

The UT Arlington Library is a past recipient of two NEH Preservation Assistance Grants to rehouse photographic negatives. Both were for the W. D. Smith Commercial Photography Collection and were in the years 2001 and 2002.

In FY2010 Special Collections expended approximately $23,000 of its own funds to hire consultants to plan for a cold storage construction project. The funds available for this expenditure accumulated from many years of fees collected for the reproduction of images in our collections. We elected to spend our own money, rather than apply for a planning grant and be delayed by the grant cycle, because of the time-sensitive nature of our situation.
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<tr>
<th>Participant</th>
<th>Title</th>
<th>Institutional Affiliation</th>
</tr>
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<tbody>
<tr>
<td>Bell, Ben</td>
<td>President</td>
<td>Scientific Climate Systems, Ltd.</td>
</tr>
<tr>
<td>Bobbit, Donald R.</td>
<td>Provost and Vice President of Academic Affairs</td>
<td>UT Arlington</td>
</tr>
<tr>
<td>Bode, Leonard A.</td>
<td>University Air Conditioning Supervisor</td>
<td>UT Arlington</td>
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<td>Dolan, Carleen</td>
<td>Administrative Manager</td>
<td>UT Arlington</td>
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<tr>
<td>Harrison, Larry G.</td>
<td>Director, University Physical Plant, Office of Facilities Management</td>
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<td>Hodges, Ann E.</td>
<td>Special Collections Program Coordinator</td>
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<td>Jones, Jan</td>
<td>Author and researcher</td>
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<tr>
<td>Lull, William P.</td>
<td>President</td>
<td>Garrison/Lull Inc.</td>
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<tr>
<td>McClurkin, Brenda</td>
<td>Historical Manuscripts Archivist</td>
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<td>Mitchell, Jeff</td>
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<tr>
<td>Reilly, James / Douglas Nishimura</td>
<td>Director / Research Scientist</td>
<td>Image Permanence Institute, Rochester Institute of Technology</td>
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<td>Schroeder, Nicholas</td>
<td>Campus Facilities Engineer</td>
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<td>Spitzenberger, Cathleen</td>
<td>LAIV Photographs</td>
<td>UT Arlington</td>
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<tr>
<td>Tyler, Ron</td>
<td>Director</td>
<td>Amon Carter Museum</td>
</tr>
<tr>
<td>Wagner, Sarah</td>
<td>Principal</td>
<td>Sarah S. Wagner LLC</td>
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<td>Weiner, Hollace</td>
<td>Archivist and author</td>
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<td>Budget Form</td>
<td>Applicant Institution: University of Texas at Arlington</td>
<td>Project Director: Ann Hodges</td>
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<tr>
<td><strong>1. Salaries &amp; Wages</strong></td>
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<tr>
<td>Project Director Ann Hodges</td>
<td>Academic year salary $72,162 (yr 1); $73,605 (yr 2)</td>
<td>10%</td>
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<tr>
<td>Archivist Brenda McClurkin</td>
<td>Academic year salary $62,757 (yr 1); $64,012 (yr 2)</td>
<td>20%</td>
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<tr>
<td>LAIV Photographs Cathy Spitzenberger</td>
<td>Academic year salary $33,542 (yr 1); $34,213 (yr 2)</td>
<td>25%</td>
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<tr>
<td>Administrative Manager Carleen Dolan</td>
<td>Academic year salary 53,897 (yr 1); $54,975 (yr 2)</td>
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<tr>
<td>Director, University Physical Plant Larry Harrison</td>
<td>Academic year salary $93,147 (yr 1); $95,010 (yr 2)</td>
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<tr>
<td>University Air Conditioning Supervisor Leonard A. Bode</td>
<td>Academic year salary $61,407 (yr 1); $62,635 (yr 2)</td>
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<tr>
<td>Campus Facilities Engineer, Nicholas Schroeder</td>
<td>Academic year salary $71,663 (yr 1); $73,096 (yr 2)</td>
<td>5%</td>
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<td>student assistant [2]</td>
<td>$7.55 hourly rate; 20 hrs/wk for 50 wks</td>
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<td><strong>2. Fringe Benefits</strong></td>
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<tr>
<td>Project Director Ann Hodges</td>
<td>30% of salary allotted to project</td>
<td></td>
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<tr>
<td>Archivist Brenda McClurkin</td>
<td>30% of salary allotted to project</td>
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<tr>
<td>Photograph Specialist Cathy Spitzenberger</td>
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<td>Library Facilities Manager Carleen Dolan</td>
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<tr>
<td>Director, University Physical Plant Larry Harrison</td>
<td>30% of salary allotted to project</td>
<td></td>
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<tr>
<td>University Air Conditioning Supervisor Leonard A. Bode</td>
<td>30% of salary allotted to project</td>
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### Applicant Institution: University of Texas at Arlington  
**Project Director:** Ann Hodges  
**Project Grant Period:** 9/1/2011 - 8/31/2013

#### Budget Form

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<th>Computational Details/Notes</th>
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<th>Year 1 (10/1/2011 - 9/30/2012)</th>
<th>Year 2 (10/1/2012 - 9/30/2013)</th>
<th>Year 3 (notes)</th>
<th>Project Total</th>
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</table>
| **Campus Facilities Engineer, Nicholas Schroeder**  
30% of salary allotted to project  
|         |         | $3,225                          | $3,289                          |                | $6,514        |
| **3. Consultant Fees**                                           |         |                                 |                                 |                |               |
| Conservator  
$1200/day; see letter on p. 195  
12 days  
$14,400  
12 days  
$14,400  
|         |         | $14,400                         | $14,400                         |                | $28,800       |
| Garrison/Lull  
See quote on p. 197.  
|         |         | $12,700                         | $14,600                         |                | $27,300       |
| **4. Travel**                                                    |         |                                 |                                 |                |               |
| Conservator  
See letter on p. 195.  
|         |         | $1,125                          | $1,125                          |                | $2,250        |
| **5. Supplies & Materials**                                      |         |                                 |                                 |                |               |
| Archival boxes and labels  
See Supporting Budget Information, p. 208  
|         |         | $24,128                         |                                 |                | $24,128       |
| Equipment and archival supplies relating to freezers  
See Supporting Budget Information, p. 208  
|         |         | $5,057                          |                                 |                | $5,057        |
| **6. Services**                                                  |         |                                 |                                 |                |               |
| Engineer  
OFM estimate  
|         |         | $24,000                         | $12,000                         |                | $36,000       |
| Vault designer/constructor  
Figure based on preliminary estimate of 10/18/2010 (Appendix, p. 166); final contract to be awarded in open bid  
|         |         | $214,000                        | $214,500                        |                | $428,500      |
| Plumbing  
OFM, based on Lull report  
|         |         | $4,000                          |                                 |                | $4,000        |
| Electrical  
OFM, based on Lull report  
|         |         | $22,000                         |                                 |                | $22,000       |
| Maintenance contract  
OFM, based on comparable contracts at UTA  
|         |         | $2,200                          |                                 |                | $2,200        |
| In-house filter replacement  
per OFM  
|         |         | $0                              | $500                            |                | $500          |
| **7. Other Costs**                                               |         |                                 |                                 |                |               |
| Flammable materials storage freezer, model FS21-20. 207 cu. ft.  
3 @ $3,018.60 each; needed per Wagner report p. 84 this proposal  
<p>|         |         | $9,056                          |                                 |                | $9,056        |</p>
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<th>Year 1 (notes)</th>
<th>Year 2 (notes)</th>
<th>Year 3 (notes)</th>
<th>Project Total</th>
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</thead>
<tbody>
<tr>
<td>10/1/11 - 9/30/12</td>
<td>Vault shelving: See Appendix p. 174; UTA Office of Grants and Contracts said 10/18/10 &quot;we generally use a 3-5% inflation rate&quot;; 4% has been applied to this line.</td>
<td>$130,000</td>
<td></td>
<td></td>
<td>$130,000</td>
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<tr>
<td>10/1/12 - 9/30/13</td>
<td>Office hardware and software: See Appendix p. 176 and line 48 note re inflation factor applied this line</td>
<td>$5,512</td>
<td></td>
<td></td>
<td>$5,512</td>
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<tr>
<td>9/1/13 - 8/31/13</td>
<td>Office furnishings: See Appendix p. 176 and line 48 note re inflation factor applied to this line.</td>
<td>$4,603</td>
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<tr>
<td>10/1/11 - 9/30/12</td>
<td>8. Total Direct Costs: Per Year</td>
<td>$441,752</td>
<td>$508,445</td>
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<td>$950,197</td>
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<tr>
<td>9/1/13 - 8/31/13</td>
<td>9. Total Indirect Costs: Per Year</td>
<td>$218,667</td>
<td>$251,680</td>
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<td>$470,347</td>
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<tr>
<td>9/1/13 - 8/31/13</td>
<td>Indirect Cost Calculation: a. Rate: 49.5% of modified direct cost per year. b. Federal Agency: DHHS c. Date of Agreement: 10/29/07</td>
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<tr>
<td>9/1/13 - 8/31/13</td>
<td>10. Total Project Costs (Direct and Indirect costs for entire project)</td>
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<td></td>
<td></td>
<td>$1,420,544</td>
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<tr>
<td>9/1/13 - 8/31/13</td>
<td>11. Project Funding: a. Requested from NEH Outright: $400,000 $400,000 Matching Funds: $0 Total Requested from NEH: $400,000 $400,000</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>9/1/13 - 8/31/13</td>
<td>b. Cost Sharing Applicant's Contributions*: $273,197 $111,205</td>
<td>$384,402</td>
<td></td>
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</tr>
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</table>
### Applicant Institution: University of Texas at Arlington
### Project Director: Ann Hodges
### Project Grant Period: 9/1/2011 - 8/31/2013

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<tr>
<th>Computational Details/Notes</th>
<th>(notes)</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Project Total</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>10/1/2011 - 9/30/2012</td>
<td>10/1/2012 - 9/30/2013</td>
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<tr>
<td>Third Party Contributions:</td>
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<td>Project Income:</td>
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<td>Other Federal Agencies:</td>
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<tr>
<td>Total Cost Share:</td>
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<td></td>
<td></td>
<td></td>
<td>$384,402</td>
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**12. Total Project Funding** $784,402

* Applicant’s Contributions include in-kind support as well as an allocation of $164,111 committed by the university’s administration (see appended letter of commitment, p. 193).
Assessments and Specialized Studies

Consultant Reports

Garrison/Lull Inc.: Consultation Report and Conservation Environment Program for New Cold Storage at the UT Arlington Library, August 31, 2010

Sarah S. Wagner, LLC: Preservation Report for the Negative Archives, August 29, 2010

Amigos/Rebecca Elder: Preservation Site Survey Report for the University of Texas at Arlington Photographic Special Collections, December 9, 2005

UT Arlington A-D Test Results
CONSULTATION REPORT
AND CONSERVATION ENVIRONMENT PROGRAM
FOR NEW COLD STORAGE
AT THE UT ARLINGTON LIBRARY

31 August 2010

Prepared for:
The University of Texas at Arlington Library
Arlington, TX 76019
Attention: Ms. Ann E. Hodges, Special Collections Program Coordinator

Copied to: Ms. Sarah S. Wagner, Conservator

Prepared by:
Garrison/Lull Inc.
PO Box 459, Princeton Junction, NJ 08550
(609) 259-8050

The issues addressed in this report concern the special requirements of library/archive environments, and are presented exclusively in an effort to protect and prolong the life of the institution's collections. In addition to these, other concerns affecting design and operating decisions will need to be considered by the architect, engineer and other professionals responsible for designing and operating the facilities. The issues herein may need to be subordinated to those other concerns.
Consultation Report and Conservation Environment Program for New Cold Storage
Prepared for the UT Arlington Library by Garrison/Lull Inc. 31 August 2010

CONTENTS
This report is prepared specifically for use by The University of Texas at Arlington and their consultants and contractors for this particular project. As stipulated in the agreement with The University of Texas at Arlington, this report is to be disclosed only on a need-to-know basis in the context of this project. This report is proprietary and constitutes the property of Garrison/Lull; it is the intellectual property of Garrison/Lull and is not to be construed to be a publication of the contents. Any person releasing this report for other purposes is liable for any damages caused to Garrison/Lull by such use or disclosure. The observations, comments and improvements are specific to this project, are copyrighted to Garrison/Lull, and are not to be used by others on other projects. Garrison/Lull reports are based on current research and understanding of the issues as they relate to a particular project in a particular context, with needs, opportunities and limitations often unique to that project. Using these comments on another project can put collections at considerable risk from inapplicable situations that may seem the same to the uninformed. Garrison/Lull regularly authors papers and articles covering general information and issues appropriate for publication and general use.

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Consultation Report and Conservation Environment Program for New Cold Storage
Prepared for the UT Arlington Library by Garrison/Lull Inc. 31 August 2010

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IPI Color Photographic Materials Storage Guide Analysis 48

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Gas-Phase Filtration Media and Technology (4 pages)
Gasco Gas Configurations (Diagrams, 2 pages)

Reference Documents (Not prepared by Garrison/Lull)
Amon Carter Vault Checklists (3 pages)
National Park Service Performance Specification for a Cold Storage Vault to be Used for Film-Based Photographic Media (20 pages)
APPENDIX 1

Consultation Report and Conservation Environment Program for New Cold Storage
Prepared for the UT Arlington Library by Garrison/Lull Inc. 31 August 2010

EXECUTIVE SUMMARY

The University of Texas at Arlington Central Library Special Collections represent a special resource and essential part of the institution's overall information services. Moreover, parts of the collections preserve historical and archival information that is rare or unique. Unfortunately, the building systems serving the present Special Collections spaces fail to provide the desired character of environmental conditions for conserving, preserving and protecting of the institution's film-based collections. A new cold storage vault is necessary to provide temperature and humidity at or near the desired set points, and to provide other aspects of an improved conservation environment for these collections.

VALUE OF COLD STORAGE. As discussed starting on page 10, the importance and value of providing cold storage for the Special Collections can be estimated using published collections management tools and the cost to reformat the collections. The as-is conditions can be approximated as 50% RH and 70 degF. The FPI Guide analysis in the appendix shows the benefits of providing better, lower temperature/humidity conditions of 30 degF and 30% RH. The avoided reformatting costs come to over $3 million per year. A cold storage vault costing around $500,000 to build is clearly justified for these holdings, as is an operating cost of $10,000 to $30,000. Even if reformatting is not a present budget item, the cold storage will keep these collections viable as an information resource for a longer period of time. Suggesting that time may also provide the opportunity for other technologies or funding to preserve the collections further.

GOALS. The cold storage project should provide cooling, humidification, positive dehumidification, fine particulate control, effective air distribution, good system operation and reliability, and control of gaseous pollutants. The project should include architectural, lighting and plumbing characteristics to complement support the project.

PROJECT OVERVIEW. The University’s selected architect and engineer would develop a performance design resulting in a set of drawings and specifications, sent out for bids from selected cold storage vault vendors and a general contractor for supporting construction work. The architect and engineer should evaluate the final vault design prepared by the vendor, and closely inspect the construction to assure consistency with the environmental design and goals of the project. The new cold storage should be adequately prepared and proved to provide stable and reliable control of the environment within the performance parameters specified before collections are moved in.

ISSUES TO BE RESOLVED BY THE INSTITUTION. As cited starting on page 15, the University needs to make decisions on certain aspects of the project before a performance design can be prepared.

COLD VAULT PROGRAM. The project program can be found starting on page 12.

CONSTRUCTION LOGISTICS AND PLANNING. The vault construction will require special attention to construction planning and logistics, as detailed starting on page 12.

PREPARATION OF COLLECTION SPACES FOR OCCUPANCY. The institution should ensure appropriate procedures in the construction and pre-occupancy phases of the project to prepare the vault for use, as detailed starting on page 18.

SUGGESTED FURTHER WORK. Consider pursuing the steps starting on page 38 to realize the suggested cold storage for the collections.
INTRODUCTION AND SCOPE

This investigation and report were commissioned by the University of Texas at Arlington and are intended to assist in planning and managing an improved conservation and preservation environment for the University collections through cold storage. The purpose is to suggest a program, guidelines and specific directions for implementing cold storage, based on the current conservation environment and future plans.

The report is based on site work on 15 and 16 April 2010, including observations at the project facilities, and meetings among the following:

Ms. Ann Hodges, Special Collections Program Coordinator, chair of cold storage strategic planning team;
Ms. Brenda McClurkin, Historical Manuscripts Archivist, member of cold storage strategic planning team;
Ms. Cathy Spitznberger, Special Collections: LALV for Photographs, member of cold storage team;
Ms. Ellen Haskerville, member of cold storage team;
Ms. Carleen Dolan, Library Facilities Manager;
Mr. Larry Harrison, Associate Director of Facilities Management, UT Arlington;
Mr. Andy Rode, HVAC Shop Supervisor, UT Arlington;
Mr. DW Gipson, PE, DWG Engineering Co.;
Ms. Sarah S. Wagner, Sarah S. Wagner LLC, consulting conservator;
Mr. William P. Lull, Garrison/Lull Inc.

For some time on the second day, Ms. Benjamin Bell and Mr. Jeff Mitchell of Scientific Climate Systems participated in the discussions to provide the perspective of a vault vendor in the planning process. At no time was SCS presumed to be the company selected by the University to build the vault; all discussions were based on competitive bidding of the vault based on performance designs and specifications to be prepared by an independent architect and engineer working for the University.

The project consulting conservator, Ms. Wagner, participated throughout, and has provided follow-up information and investigations on the project, as noted below.

The following documents and drawings were used as a basis for this report:

- Central Library Schematic Floor Plans, Basement and 6th Floors, unattributed
- Preservation Site Survey Report, Robocat RMC, Adjunct Preservation Field Services Officer, AMIGOS Library Services, Inc., Final Report 9 December 2006.
- Film Format Inventory spreadsheet, Ms. Hodges, Ms. McClurkin, undated.
- Garrison/Lull Program and Building Survey Forms, completed by Ms. Hodges, Ms. McClurkin, and Ms. Dolan, 8 April 2010.
- National work Service Performance Specification for a Cold Storage Vault to be Used for Film-Based Photographic Media, Sarah S. Wagner LLC, 20 April 2010.
- Vault Layouts, Option 1 and Option 2, Sarah S. Wagner LLC, 6 June 2010.
- Preservation Report for the Negative Archives Special Collections, Sarah S. Wagner LLC, 19 August 2010.

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Many of the observations in this report are second-hand, based on information reported by the institution staff.

SCOPE. Garrison/Lull is serving as a consultant to the University of Texas at Arlington to help in defining conservation environment needs to promote conservation of the collection, and to plan an effective conservation environment for the collections through the building and building systems.

The comments offered by Garrison/Lull are based on established and published principles in building physics, construction technology, informal and formal research, and on observations and experience at many other museums, libraries, and archives. Garrison/Lull services are not a substitute for any services requiring a licensed architect or professional engineer. The services do not identify possible problems in all details of the building design, and are not intended to identify any potentially unsafe or deteriorating conditions. Garrison/Lull is not a licensed engineer or architect, is not a construction official, and performs no architectural, engineering or building construction services, including but not limited to preparing actual design drawings, specifications, and calculations, or identifying and resolving issues of public health and safety.

The observations in this report focus on certain issues and options in establishing a better conservation environment, and to clarify the institution's issues and needs to design professionals. Garrison/Lull is only responsible for raising and clarifying conservation environment issues for the institution; the institution and a professionally qualified architect and engineer are responsible for taking action on the issues raised. This report is not in any way an engineering evaluation of the systems; all observations and comments should be independently accepted, verified and/or modified by the institution's architect and engineer before being considered for use in any design.

The University of Texas at Arlington has agreed to defend, indemnify, protect and hold harmless Garrison/Lull Inc., their officers, agents and employees from any and all claims for injury or damage to person or property arising out of any failure of the building systems or any services provided by the University or their agents in connection with the project, including but not limited to costs of investigation, court costs, counsel fees, settlements and judgments.

Garrison/Lull services have not addressed the specific condition or sensitivities of the collections and the services are in no way a substitute for the services of trained conservators. The comments offered here do not include specific issues relating to handling, use and storage of the collection, nor to specific functional and conservation merits of furnishings, storage cabinets and exhibition cases.

The set of improvements to implement the cold vault is in the "Conservation Environment Program." These are intended to be used as program issues, criteria and guidelines for use in design efforts by others. These should be part of the institution's program charge to the institution's architect and engineer, who would prepare designs.

Digressions included on some items are for the benefit of the uninformed reader and are not intended for the experienced design professional.
APPENDIX 1

COLLECTIONS ENVIRONMENT OBSERVATIONS AND EVALUATION

This section describes the collections and the existing conditions of the collection environment to provide a context for the past environment of the collection, the environmental evaluation, and the need for the improvements.

COLLECTIONS AND PRIORITIES

The institution was founded in 1895, and the University describes the Special Collections as historical materials relating to Texas, the U.S. War with Mexico (1846-1848), the cartographic history of Texas and the Gulf of Mexico; and Mexico from 1810-1920. The collections include more than 50,000 volumes, 9,000 linear feet of manuscript and archival collections, 7,000 historical maps, 4 million photographic prints and negatives, and thousands of items in other forms. Special Collections has diverse research materials focusing on Texas; Mexico from 1810 to 1920; the U.S. War with Mexico of 1846-1848; and the cartography of Texas, the Gulf Coast, and the Greater Southwest. Its archives and manuscripts collections include historical manuscript collections, photograph collections, collections on Texas labor and politics, and university archives.

The project collections to be provided with cold storage consist of multiple formats of acetate photographic media with black and white, and color emulsion images. The subject collections targeted for cold storage must be segregated and kept at long-term archival quality environmental conditions. This storage would be at lower temperature and relative humidity.

In general, the first priority is to avoid acute risks from biological (mold and pests), fire and water damage. After protection from acute loss, the largest method to prolong the life of the collections is to reduce the rate of chemical and photo-chemical deterioration by reducing temperature, humidity, light and contamination. As the collections are damaged by these mechanisms, they may loose their informational or research value, or may simply be in too poor condition to be used without the risk of further and aggravated damage from handling. Some may be reformatted to recover informational value, while others may be permanently compromised from loss of research or artificial merit.

ARCHITECTURAL/GENERAL

The Central Library was built in 1964, with floors 4 through 9 added in a 1980 renovation. It presently has 6 levels above grade, and one level below grade. The building is not classified as historic, and exclusive use is for library functions.

The Library is currently undergoing renovations for life safety on each floor. This includes adding new sprinkler systems, new lighting, new ceiling & grid, painting, and other associated work. The basement may be the floor to be done in the summer of 2011, but this has not been decided.

The Central Library has a reported 201,040 square foot gross area, approximately 60% of which is for collections. Presently, the Special Collections are kept on the 5th floor, and occupy 14,184 square feet, of which 90% is dedicated to storage.

COLLECTION STORAGE. Subject film collections are presently stored on fixed metal shelves and in metal storage cabinets. These are reported to provide
2,355 linear feet of shelving and approximately 650 square feet of storage.

HVAC/MECHANICAL

The Central Library is served by campus chilled water, available "24/7" at 42
degF, "500 GPM maximum." However, it is also reported that the system is
usually shut down on Friday and Saturday nights for energy conservation. Note
that the campus chiller plant is not on emergency power, so systems dependent
on campus chilled water not be effective in the event of a power failure.

The Library is served by 14 air handlers, retrofitted with variable-frequency
drives (VFDs) approximately 5 years ago. An air handler on the roof provides
outside air to the Library air handlers with the same operating schedule as the
chilled water.

The Library is also served by campus steam, distributed at 200 pounds, but
reduced at the building to 40, 15 or 5 pounds as needed. Most steam presently
available in the library is 40 pounds or less. The campus steam is treated to
protect the distribution system, making it inappropriate for direct use for
humidification. The campus steam has a scheduled outage each May for 3 to 4
days.

HUMIDIFICATION. Campus experience with humidification includes steam-to-steam
converters as well as electric humidifier bulbs, typically Armstrong and
Nortec. The campus also maintains several Liebert units.

DEHUMIDIFICATION. In addition to the use of chilled water for
dehumidification, there are also several desiccant wheels installed on campus,
including a new wheel installed the Engineering Laboratory Building. The
latter is installed on the roof and is regenerated with the 200 pound campus
steam.

NEW AIR HANDLERS. As new six handlers are installed on campus there is a
preference for fan wall supply air fans with VFDs, typically Slimline or ABB.
Coils are a maximum of six rows, with copper fins on cooling coils, while steam
coils can have aluminum fins.

FILTRATION. Typical aggressive particulate filtration used on campus are MERV-
13 and HEPA filters. No present use of gas phase filtration on campus, except
on fume hoods.

Filter pressure are typically monitored by the Siemens BACS, with local
Manakalic gauges. Filters are changed based on pressure drop.

HVAC CONTROLS. The campus has a Siemens building automation and control system
(BACS), reported to have the latest software. Typical campus operation
monitoring for buildings is to the campus thermal energy plant, with an alarm
printout with a call list.

FIRE PROTECTION

The Central Library is in the process of having sprinklers installed.
Sprinklers are already installed on floors 4 and 5. As this is completed, this
is addresses a significant risk to collections within.
LIGHTING

The present light levels in storage are generally high. While this is not a preservation issue, since the collections have a primary enclosure, it does set a precedent for the current task efficiency. New spaces should have similar light levels.

ELECTRICAL

The library presently has a 260 kW emergency generator to power emergency lighting, elevators, server/hub, sprinklers, and fire pump. This generator is in the process of being replaced with a larger 500 kW unit being moved from another location on campus. The additional capacity of the new generator is reported to be needed for the fire pumps that are being added as part of the new sprinkler systems being installed.

ENERGY USE

The building is served by electricity, campus chilled water, and campus steam.

Based on the rates provided in April, 2010, the thermal cost of each energy source available on campus is as follows:

\[
\text{$/1,000,000 \text{ BTU}}
\]

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>$0.007/kWh @ $4.12 BTU/kWh = $29.57 (average including demand charge)</td>
</tr>
<tr>
<td>Gas</td>
<td>$0.595/CCF @ 100,000 BTU/CCF = $5.95</td>
</tr>
<tr>
<td>Steam</td>
<td>$0.001/1,000 KWh @ 1,000 BTU/Lb = $7.61</td>
</tr>
<tr>
<td>CHW</td>
<td>$2.160 /Ton-Days @ 288,000 BTU/T-Day = $7.50</td>
</tr>
</tbody>
</table>

This means that on a strictly thermal basis, as might be used for steam humidification, heating, reheat, or desiccant regeneration, electricity is between 4 and 5 times the cost of natural gas, and 3 to 4 times the cost of campus steam.

No building metering is done on campus so no existing per-square-foot energy use could be estimated.

OPERATING FUNDS

The University presently has no budget for conservation treatment of Library collections. The operating funds come from student fees, and the University Provost funds allocations, with no endowment support for the Library.

MAINTENANCE

Mr. Bill Poole, Assistant Vice President for Facilities Management and Campus Operations, reports that the UT Arlington campus facilities are maintained by approximately 200 Facilities Management employees working as a team to provide the following services:

- Asbestos Management;
- Carpentry;
- Custodial Services;
- ...
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Planning, Design and Construction;  
Campus Renovations and Campus Master Plan;  
Vehicle Maintenance;  
Housing and University Center maintenance;  
HVAC;  
Landscaping and Grounds Maintenance;  
Painting and Signage;  
Plumbing Systems;  
Thermal Energy;  
Electrical Systems;  
Energy Management Control.

The Office of Facilities Management oversees all phases of campus facilities maintenance.

Mr. Harrison, who was involved in most of the April 2010 project discussions, is Associate Director for operations, and has primary responsibility for: Elevator Support, Landscaping, HVAC, Thermal Energy Plant, Vehicle Maintenance, Energy Management Control, and Information Technology.

Each building is assigned an HVAC service person, with a designated backup person.

COLD STORAGE MAINTENANCE EXPERIENCE. While well-staffed, the campus presently has no cold storage walls, and no experience or expertise was expected directly applicable this cold storage project and systems. Additional training, and/or outside maintenance contracts are expected to be required.

COLLECTIONS ENVIRONMENT MONITORING

Special Collections has seven (7) dataloggers, in use since 1996; these are not regularly recalibrated. The collections have also been monitored for vinegar syndrome with ITA & B strips, and a detailed record of these results are kept.

PREVIOUS REPORTS

The AMigos February 2001 Photographic Collections Preservation Site Survey Report (page 9), and the 9 December 2005 Preservation Site Survey Report (page 26) both recommend cold storage for the Special Collections photographic collections.

BUILDING SYSTEM PROBLEMS

The following problems with the building systems relate to or ultimately pose a threat to the collections.

Water has entered the basement twice due to a clogged drain; however, the staff does not consider this a chronic problem since the offending drain has been fixed. There has been no flooding in the basement for three years, and no flooding has occurred in B03, B23, B24 in over 10 years.

Power outages are cited as frequent.
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VALUE OF COLD STORAGE

The importance and value of providing cold storage for the Special Collections can be estimated using published collections management tools. As verified by the work documented in Reference 1, deterioration of cellulose acetate film over time is a considerable risk for most film collections. Moreover, research at the Image Permanence Institute (IPI) has verified and quantified the correlation between film life and temperature/humidity storage conditions. The results of this research are published in Reference 2, IPI Storage Guide for Acetate Film; and in Reference 3, Storage Guide for Color Photographic Materials.

At the April 2010 site visit, the previous inventory of holdings was evaluated for cost to reformat. This evaluation is documented the Fugitive Media Reformat Cost Analysis in the appendix, and summarized below:

| Total Cost to Reformat |  |
|------------------------|  |
| "Fresh" Acetate:       | $75,000,000 |
| "Actively Degrading" Acetate: | $6,000,000 |
| Color Chromogenic:      | $37,000,000 |

This "value" of the collections is the cost to recover from deteriorated collections that can no longer be used but require copying or reformatting to be placed back into service. These values are conservative, based on reformatting and not conservation or repair of the material. This does not account for the loss of intrinsic value of historical holdings in that they lose their artificial value when copied or reformatted.

PERMANENCE VALUE TO THE COLLECTIONS: The as-is conditions with conventional comfort air conditioning can be approximated at 50% RH and 70 degF. The IPI Guide analysis in the appendix shows the benefits of providing better, lower, temperature/humidity conditions. For the selected temperature of 50 degF and 30% RH, the avoided reformatting costs are as follows:

<table>
<thead>
<tr>
<th>Total Savings per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Fresh&quot; Acetate Film</td>
</tr>
<tr>
<td>&quot;Actively Degrading&quot; Acetate Film</td>
</tr>
<tr>
<td>Color Photographic Film</td>
</tr>
<tr>
<td>Total Savings per Year =</td>
</tr>
</tbody>
</table>

At a conservative value of over $1 million per year, a cold storage vault costing around $200,000 to build is clearly justified for these holdings, as is an operating cost of $10,000 to $20,000. Clearly the Library is not prepared to undertake the reformatting otherwise necessary to recover from collections loss with or without cold storage, but the cold storage will keep these collections viable as an information resource for a longer period of time. Saving that time may also provide the opportunity for other technologies or funding to preserve the collections further.

The IPI Guide analysis is also helpful to consider warmer cold storage conditions. As shown in the appendix, major additional savings occur at 30 degF compared to higher temperatures of 40, 50 or 60 degF, while there are not major capital or operating cost savings from building a warmer vault.
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PRECEDES

The conditions sought for the project collections are not unique, nor is it at all unprecedented for a similar project in similar current conditions to undertake this character of improvement program. The following are precedents of the character of this project in both before conditions and in improvements planned or undertaken. Note that these are institutions with similar space and financial constraints.

Amon Carter Museum - Program for Film Vaults; Fort Worth, Texas, 1993-94.
Matherre Museum, Indiana University- Natural History Specimen Cold Storage Vault; Bloomington, Indiana, 1979, 1999. See the AIC paper prepared on this project at: http://mysite.verizon.net/vmeltem/sitebuildercontent/sitebuilderfiles/matherre1.txt.txt.
Delaware Archives - Cold Storage Room Program; Dover, Delaware, 1998.

The institution should consider visiting one or more of these projects for tours and discussions with relevant staff. The institution should contact Garrison/Lull for people to see at these institutions to be sure the important areas and issues are viewed and discussed.
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COLD STORAGE VAULT PROGRAM

This program is intended to assist UT Arlington and their architect and engineer to develop and differentiate the options for providing cold storage for the special collections film holdings; it is not to be used directly for construction. The appropriate participation of such licensed professionals is assumed in this program. This program is a complement to, and not a substitute for, the normal issues and concerns that are the responsibility of the architect and engineer charged with design. This program sets suggested criteria, goals and guidelines for the cold storage environment as expressed in the architectural, HVAC and lighting disciplines. Also discussed are expectations for design details, issues in construction logistics and planning occupancy and operation.

The issues noted in this program concern the special requirements of museum and library/archival environments, and are presented exclusively in an effort to prolong the life of the institution’s collections. Other concerns affecting design decisions, in addition to these, will need to be considered by the architect and engineer charged with the responsibility of design, and the issues herein may need to be subordinated to those other concerns.

A separate report on this project from the consulting conservator, Ms. Wagner, covers issues relating to the use, storage and handling of the subject collections. Her report is expected to be used to provide such guidance on those topics to the project design professionals.

INTRODUCTION

The UT Arlington Central Library Special Collections represent a special resource and essential part of the institution's overall information services. Moreover, parts of the collections preserve historical and archival information that is rare or unique.

Unfortunately the building systems serving the present Special Collections spaces fail to provide the desired character of environmental conditions for conserving, preserving and protecting the institution's collections. A new cold storage vault is necessary to provide temperature and humidity at or near the desired set points, and to provide other aspects of an improved conservation environment for these collections.

The project should provide cooling, humidification, positive dehumidification, fine particulate control, effective air distribution, good system operation and reliability, and control of gaseous pollutants. The project should include architectural, lighting and plumbing characteristics to complement the environmental goals to protect the collections.

Other aspects to the project, particularly to meet specific storage, work and other vault space needs, will also need to be considered in the project. These are to be found in Ms. Wagner's report, and are beyond the scope of this document and Garrison/Lull services on this project.

PROJECT OVERVIEW. Where appropriate, the institution should retain the services of a registered architect and/or a professional consulting HVAC engineer to design the project. Considering the goals and priorities suggested here, preference should be given to any engineer who is already familiar with the institution and its systems, and has provided competent and timely services in the past. The extent and scope of the design should be based on the institution’s desired scope of the project and the funding available.

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In most cases the architect and engineer will develop a performance design resulting in a set of drawings and specifications. These documents should be coordinated with the conservation program goals during the design process, and carefully evaluated before bidding for their suitability to achieve the intended conservation environment goals. After coordination and modifications, if any, the drawings and specifications may be sent out for bids from selected cold storage vault vendors. The institution’s architect and engineer should evaluate the final vault design prepared by the vendor. The architect and engineer should closely inspect the construction to assure consistency with the environmental design and goals of the project. The new space should be adequately purged to remove any gaseous contaminants from construction. The new systems should be tested and balanced. Collections should not be moved in until the new systems have proved to provide stable and reliable control of the environment within the performance parameters specified.

CONSERVATOR INVOLVEMENT

Continued input from a conservator is important. This should include:

a. Advice on work flow for collections handling, such as door widths, swings, location of doors and rooms;
b. Evaluation of construction materials, particularly paints, sheet goods, wood materials, finishes for furnishings, and paints; possible Oddy tests for samples;
c. Advice on collection protection during the renovation, including packing, storage and reinstallation;
d. Comment on this report in general.

Also see this report’s index for specific references to conservator involvement.

The institution should be sure that those contributions from a conservation professional are part of the project planning.

CONSERVATION ENVIRONMENT CRITERIA

One of the primary goals is a consistent, stable and quality environment for the collections to prolong its life and protect it from damage. The new environment should provide stable temperature and humidity, and should protect the collections from harmful contamination.

PRIORITIES. As indicated above, it is important to provide a general quality library environment for the collections to prolong their life. Based on the particular sensitivities of this collection, the institution, and the ambient environment, particular priority should be given to providing reliable cold storage conditions.

COLD STORAGE

As discussed at the April 2010 site visit, and based on references 1 and 4, and the IPI analysis on page 10, cold storage should meet the following criteria:

- Temperature between 30 degF +/-2 degF;
- Humidity between 25% and 35% relative humidity (RH), with the time-weighted average at 30% RH;
- Control of gaseous and particulate contamination levels not to exceed; effective 90% removal of 1-Micron particulates;
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less than 1 ug/m³ (0.38 ppb) of sulfur dioxide;
less than 5 ug/m³ (2.5 ppb) for oxides of nitrogen;
less than 25 ug/m³ (12 ppb) of ozone; and,
best available control for hydrochloric acid, acetic acid,
formaldehyde, and any measurable solvents.

Since condensation can be expected at temperatures much below 55 degf, storage
design will need to provide pre-conditioning before removal of objects from
cold storage.

GASEOUS CONTAMINATION CONTROL FOR COMMON STORAGE. Since the several media
types have been merged in cold storage, the common storage spaces will require
gas-phase filtration. The media should be segregated by shelves or ranges to
allow free air flow between the media types. This air should then be
effective filtered for acetic acid, inorganic acid-gases (sulfur dioxide and
oxides of nitrogen), volatile organic compounds and oxidising agents (such as ozone).

LIGHT EXPOSURE. Since all the collections will have primary enclosures, and
the cold storage lighting will only be on for a few hours each week, no special
precautions are necessary to limit light exposure. Light levels should be
designed for maximum task productivity so as to minimize time spent in the cold
storage areas. The following goals should be set:

Minimum vertical illumination at stack ranges (bottom shelf) of no less
than 2 footcandles;
40 to 60 horizontal footcandles at the collection inspection and work
areas.

UV CRITERIA. In work areas, and to preserve labeling, UV should be controlled
with adequate source or filtration to limit exposure to no more than 20 μW of
ultraviolet radiation (defined as radiation shorter than 380 nanometers) per
lumen of visible light.

MONITORING. An important aspect to a proper environment is monitoring. The
institution should be able to know as soon as possible whenever the storage is
deviating from normal conditions. This is not only important for protection of
the collections through corrective action, but it helps the institution know
when certain events may precipitate off-normal conditions. In many cases,
space use, maintenance procedures, or other aspects of the institution's
operation may need to be changed to provide a safer and more consistent
environment for the collections.

OUTDOOR DESIGN CRITERIA
The HVAC design engineer should carefully consider the selection of exterior
design criteria, particularly as they define the extreme latent load from
outside air. Unless vigorous justification is provided to the contrary,
exterior dehumidification criteria should be no less than ASHRAE 0.4%
'Dehumidification' conditions for Wet Bulb/Mean Coincident Dry Bulb, Chapter
14, ASHRAE 2009 Fundamentals.

BUILDING OPERATIONS CRITERIA
The vault should be designed to be consistent with the character of operations
effort and staff that the institution can provide. While the institution is
willing to provide reasonable staff necessary consistent with the collections
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and institution program, certain opportunities and limitations should be
considered by the institution’s architect and engineer. It should be clear
that the institution will not be able to provide the character of operating and
maintenance support as that found at a hospital, laboratory, or high-tech
manufacturing facility. Equipment and designs requiring that level of
attention should be avoided.

CANDIDATE LOCATIONS FOR THE COLD STORAGE VAULT

In considering the possible location for the cold storage, several candidate
spaces were considered:

1. Central Library Room B05, 44’x22’, 968 sq ft, 9’6” clear;
2. Central Library Room B23 (small end), 12’6” x 12’8”, 159 sq ft, 9’6”
   clear;
3. Central Library Room B23 (large end), 8’11” x 9’6”, 76 sq ft, 7’6”
   clear;
4. Central Library Room B24, 22’x22’, 484 sq ft, 8’6” clear;
5. Library Collections Depository, a build to suit addition.

The Library Collections Depository (5.) was evaluated and discounted as not
providing as good protection from disaster/severe weather, and lacking any
connections to the campus chilled water or steam. It was also seen as
problematic for collections access, and requiring the additional capital cost of
building the addition.

The other Library spaces, (2.) through (4.) were considered but are too small
to provide adequate space with expansion, and some had limitations for adequate
clear height for building a vault within.

At the April 2010 discussions, it was clear that the only space that could
accommodate a vault would be (1.), the Central Library Room B05, using some
additional space in the adjacent staff lounge, Room B08. The available space
size was critical to the decision, since there would be an economy of scale to
the vault construction, and a larger space would allow for expansion of the
cold storage holdings.

ISSUES TO BE RESOLVED BY THE INSTITUTION

Most of the items in the subsequent sections of this program are clear
directions, goals and guidelines for design, providing a list of issues to be
considered by the architect and engineer to provide the appropriate
conservation environment. Where options are listed, they are among those that
might be entertained by the institution’s architect and engineer, and where the
architect and engineer can usually take the lead. The following items are an
exception, requiring further consideration and resolution by the institution,
with advice from the institution’s architect and engineer, and the
conservator. Before a clear conservation environment program charge to the
institution’s architect and engineer can be made.

1. LAYOUT AND PRICING OPTIONS FOR VAULT A AND VAULT OFFICE. As discussed at
   the April 2010 site visit, the University needs to consider the cost and
   other implications for the options for treating the smaller “Vault A” and
   the “office” in the Wagner report sketches. These options should be priced
   so the University can make a final decision as to the necessary space
   layout, use and conditions to be maintained.

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a. VAULT A AS COMMON VAULT SPACE. This would be Vault A, while physically separate, kept at the same temperature/humidity as Vault B (i.e., 30 degF at 30% RH).

b. VAULT A AS INTERIM CONDITION STORAGE. Vault A would be actively maintained at 45 degF and 35% RH (28 degF dew point). This would presumably be a separate control zone, but not a separate air handler, from Vault B. The Vault A zone would need reheat and humidification. This option evaluation should also note the equipment capital and operating cost penalty compared to (a). The Library should be clear about the value of these interim storage conditions since this option has the greatest capital and operating cost implications.

At 55 degF, items kept in Vault A would need little or no post-conditioning upon removal to the ambient Library conditions to avoid condensation. Yet, at 55 degF and 35% RH, items could be moved from Vault B to Vault A without condensation. (Note well that any Vault B items moved to Vault A would need to equilibrate to the 55 degF temperature before being exposed to the ambient Library conditions without problem condensation.)

c. OFFICE AS TRANSITION SPACE. The Office would be actively maintained at 55 degF but not at a higher humidity; this means that the cold storage dew point of 52 degF would be maintained, and the Office would be at approximately 10% RH. As (b.) above, this would presumably be a separate control zone, but not a separate air handler, from Vault B. The Office zone would need reheat but no humidification. This option should also note the equipment capital and operating cost penalty which should be significantly less than (b.), much closer to (a.).

At 55 degF, items moved from 30 degF vault storage and allowed to equilibrate to 55 degF would need little or no post-conditioning upon removal to the ambient Library conditions to avoid condensation.

d. OFFICE AS NORMAL LIBRARY SPACE. The Office would only provide physical security at the vault entry, and would be served by the main Library HVAC, using the supply/return capacities previously serving the 805 area. No separate HVAC would be provided.

At ambient Library conditions, items could NOT be moved from 30 degF vault storage to the Office without condensation. All items would need to be bagged and then allowed to warm to at least 55 degF before being exposed in the Office. This may cause a problematic condition, and is discouraged if not used with option (b.) above.

It is expected that the least-cost, yet compatible conditions would be (a.) and (c.). The other option would be (b.) with (c.) or (d.). The combination of (a.) with (d.) may cause problems, as discussed immediately above.

2. COLLECTION INSPECTION LIGHTS. The institution needs to determine what type of special lighting is needed for the collection inspection lights in the work areas. Concerned staff should compare and decide between a high color-rendering index (CRI) fluorescent T8 or T5 lamp, a “daylight” fluorescent T8 or T5 lamp, and a tungsten A- or R-lamp. The comparison should be made with fluorescent background lighting with each source judged at the same foot candle level. All other things being equal a fluorescent lamp would be better from and energy and operating cost standpoint.
3. UTILITY DROPS IN VAULT. The Library needs to consider the needs in the vault for various utility and communications connections. They should explicitly show where they will need telephone, power, data and security connections.

4. VAULT SECURITY AND ACCESS. The University will also need to coordinate vault security and access with the campus card access system. Tentatively, the most exterior door should have a key lock, while the inner doors should have card access.

These requirements should be forward to the design team and included in the project performance design.

PROGMAMATIC ASSUMPTIONS

This project program is based on certain assumptions on collections and space use, and collections environment planning.

1. PATRON ACCESS. Patrons presently have on-demand access to the collections. For those items to be kept in cold storage, advance notice and post-conditioning will be required for access. This will be a change in current procedures.

2. TIME OUT OF STORAGE. As cited in the IFI Acetate Film Guide, the time out of storage can have a significant impact on the preservation value of cold storage. For those items that are paged out, they should be returned to storage as soon as possible. This is a particular concern for the Star Telegraph items that are not returned in a timely manner.

In both cases it may be appropriate to have service duplicates made for items that are frequently paged out.

COLD STORAGE VAULT

This section describes the special architectural, HVAC and fire protection needs of the film cold storage vault. They are based on the applicable references cited, discussions with the institution staff, various precedent film storage facilities, manufacturers of equipment, and providers of turn-key design services. These goals are intended to help the design architect and engineer to prepare a performance design specification for the vault and to aid in reviewing the design submitted by the successful design-build firm. It is expected and hoped that many of these goals will be standard practice for the successful design-build firm. They should nonetheless be expressed in the design and confirmed by the independent architect and engineer.

GENERAL DESIGN

1. ARCHITECT AND ENGINEER’S PERFORMANCE DESIGN. The performance design and specifications prepared for competitive bidding should consider the guidelines in this report, with particular attention to the existing conditions and campus precedents and preferences as described on pages 6 through 9 herein. Where they do not conflict with this report, also consider the National Park Service performance specification for a Cold Storage Vault to be Used for Film-Based Photographic Media (Sarah S. Wagner Inc, 20 April 2010).
2. SOURCE OF VAULT DESIGN AND CONSTRUCTION. Since the storage vaults will require special design expertise they should be designed by a firm with several successful projects of this character in their past. This will rule out virtually all normal HVAC engineers and limit the design to specialists and design-build companies. Another major concern is that of single responsibility for the vault performance. The design should not be placed out for open bidding nor should local subcontractors be used since this allows inexperienced crews to execute a design that may ultimately rely on specialized craftsmanship of the construction. Many vault problems can be attributed to a design firm with sketchy experience or a split between the design firm and the construction. The construction should be by the company providing the design so that any problems or failures can be isolated to a single responsibility for all aspects of the vault performance. This includes all wiring and electrical work as well as the refrigeration and air handling work, and the vault envelope fabrication.

The design-build contractor should assign a designated person to deal with the institution's project from start to finish. There should not be a different person used for design and then for construction. The person assigned to the project should personally have a track record of several successful projects, not just the company.

The University's independent architect and engineer should only be responsible for providing detailed designs and specifications for space, structure, power, water, drains and other connections for the vault systems; all other aspects of the vaults should be the responsibility of the vault design/build company.

3. LOCAL MAINTENANCE. An important feature of the design-build contract for the vaults should be the affiliation or joint venture with a local refrigeration service organization. While service of any special parts of the system might require specialists from the design/build home office, the typical preventive maintenance activities and typical major repairs (such as a compressor replacement) should all be available through a local company. This service should include all maintenance to the system including filter changes and other aspects to system operation that the institution staff are otherwise qualified to perform. The reason for this is to preserve continued single responsibility for system performance. The local service organization should be as one with the design-build firm for responsibility - there should be no opportunity for the home office to blame the local service company for any system problems or failures.

4. MAINTENANCE CONTRACT. The system should be bid with a three (3) year service contract as part of the project including all parts and labor. The contract should also specify that the contract is for performance of the system at the design levels of temperature and humidity. The successful design-build company should also provide estimates for annual extensions of the service contract, with an initial escalation, but with guaranteed renewal of the service contract, further guaranteed by the design-build home office.

5. VAULT SPACE. The space required for the vaults will usually require additional vertical space. The design architect should allow for this space, as well as adjacent space for the location of support equipment. Many vendors offer to put the equipment on top of the vault, and while this may increase the project space efficiency, it is a compromise that virtually every institution with it wishes it had not been made. To adequately inspect, maintain and service this type of equipment it should
be in a mechanical room accessed through a door; access should not be with
a ladder.

The vault location identified in the April 2010 site visit, and shown in
the Wagner report sketches, meets these goals.

6. LOCATION OF ROOM CONDITIONING EQUIPMENT. The terminal equipment serving
the vault (the air handler) can either be located in the vault proper or
outside the vault. While it is less expensive and easier to place
the equipment in the vault this has several drawbacks:

a. Loss of storage space - vault space is occupied by equipment. with
   further space lost to areas that must be kept clear to access and
   service the equipment.

b. Risk to collection - the equipment can cause fires, can throw off
   particulates or contaminants upon failure, and can leak moisture due to
detmelt cycles.

c. Uncoordinated air flows - instead of a single tempered air stream the
   vault must be conditioned by several separate supply/return air
   streams, usually one for the desiccant air, one for the filtration air,
one for the evaporator, and one for the outside pressurization air.
   This not only complicates the space but gives the opportunity for
   uninvited space conditions, particularly for thermal stratification of the
   hot air from the desiccant discharge air. While this problem can be
   dealt with when the air handler is in the vault, it usually increases
   the amount of vault space lost to ducts.

d. Intrusion on collection - with the equipment in the vault it will be
   necessary for maintenance crews to enter the vault for inspections and
   preventative maintenance, creating a risk to the collection from
   uninformed repair crews, and disturbing what otherwise might be a more
   stable environment.

e. Unstable conditions during repairs - if the equipment does require
   repairs then the workmen entering and leaving the vault to affect
   repairs would allow conditions to deteriorate much more quickly than if
   the vault remained sealed.

For these reasons the vault conditioning equipment should be located
outside the vault so long as the project budget permits. In this way the
only connection to the vault will be through a supply and return air duct.

This will require special construction of the air handler to assure that it
is properly fabricated and insulated to avoid frost problems. This will
always require double-walled construction and the unit should have no
insulation exposed in the air stream.

AIR HANDLER LOCATION. Access for effective service is very important. The
vault air handler should be located in a mechanical room; it should not be
located over the vault.

The vault location identified in the April 2010 site visit, and shown in
the Wagner report sketches, meets these goals.

7. VAULT ENVELOPE CONSTRUCTION. The vault should be constructed of
prefabricated insulated panels with an external vapor-proof structure; the
vault should not be site-built using conventional construction materials.
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The floor of the vault should also be built with insulated panels, and be  
designed to support the movable shelving planned.

If pipes run over the vaults they should have drain pans or a waterproof  
cover should be provided so that any leaks will not reach the outside of  
the vault.

PANEL INSULATION THICKNESS. The thickest practical panel insulation should  
be used to afford low operating costs and the ability to maintain  
conditions for an extended period upon equipment failure. This usually  
means using 3- or 4-inch panels instead of 2-inch panels.

8. PRESSURIZATION. The vaults should be operated at a positive pressure to  
assure that unconditioned or inappropriate air will not be drawn into the  
vaults. This applies to infiltration of air at the envelope of the vault,  
at the air handler and at the desiccant wheel.

9. AIR LEAKS. To assure air tight construction, consider requiring a pressure  
test, as suggested in the 2010 NEH Performance Specification: "A  
bLOWER DOOR TEST shall be required to verify that the cold storage vault is  
air-tight at one air change per hour at 50 pascals (1 ACH 50)."

10. ENTRANCE AND AIR LOCKS. The number of entries and other penetrations of  
the vaults should be minimized to minimize loads and maximize storage space.  
The entry to each vault should also have an air lock or vestibule.

COOL STORAGE. Ideally, entry to a cold storage area (less than 60 degF)  
should be through an intermediate cool storage area (at about 60 degF) to  
provide basic protection of cold storage conditions. To further protect  
cold storage, particularly when lower temperature criteria are to be met, a  
small vestibule should be provided so that air cannot easily enter cold  
storage. The entry to cool storage should similarly have an air lock.

AIR LOCK ALARMS AND INTERLOCKS. Each air lock should have an alarm that  
flashes a light and rings a bell whenever both doors to an air lock are  
open. If appropriate the doors might also be equipped with magnetic  
closers on an interlock system where each door is locked while the other is  
open. If such interlocks are used they would of course need to be  
connected to the fire alarm system so that excess would not be impeded in  
the event of a smoke or fire condition.

11. AIR FLOW INSIDE VAULTS. Due to the low ceiling height and limited space,  
the supply air diffusers should be carefully located to avoid blowing  
supply air directly on collections in storage and particularly on  
collection work areas. To allow adjustment of supply air there should be  
adequate balancing dampers provided in the supply duct system.

STRATIFICATION. Some vaults have had problems with thermal stratification,  ten due to the direct discharge of hot desiccant process air into the  
vault which does not readily mix with the cold vault air. Although the  
main solution has to do with the process air discharge, stratification can  
also be reduced by drawing return air from low in the vault and introducing  
supply air high.

12. SMOKE DAMPER. The vault proper should be isolated from the vault air  
handling system with a motorized smoke damper (not a fire damper). This  
should not only be closed in the event of smoke detection, but should close  
upon confirmed failure of the system. (See later item 40, on page 27.)
13. PARTICULATE FILTRATION. Due to the extremely sensitive nature of the collection it may be appropriate to upgrade the particulate filters of the vaults to 99% efficient MERV-14 or HEPA filters.

14. INSULATION. All insulation should be a closed-cell foam material such as extruded/expanded polystyrene, polyisocyanurate or Armatex. Fiberglass insulation should not be used.

15. DOORS AND LIGHT SWITCHES. To allow inspection of the vault without disturbing the conditions within, each access door should have a window to allow general observations inside. The main lights in the vault should have a switch located outside the door to allow observations without opening the door (also see below).

16. LIGHTING. Preferred treatment would be surface-mounted fixtures with wrap-around lenses oriented 90 degrees to collection aisles. UV filtration should be provided at the lens rather than with a sleeve.

LAMPS. To provide a good color rendering index use high CRI fluorescent fixtures, using lamps that are standard stock for campus maintenance. The lighting design should take into account the lower output of fluorescent lamps at lower temperatures.

(Though LED lights could be used, they are not standard lamps stocked on campus, they would have poorer CRI, and the energy savings would be minimal for the time they would be on in the vault.)

SWITCHING. The larger vault should have circulation/range switching with only the central circulation lighting controlled by a separate switch just outside the entry door. Range lighting should be controlled by separate switches near the circulation aisle near each area; the range switches should not be clustered at the doors.

17. FIRE DETECTION. The vaults should be provided with aggressive fire detection. The design engineer should note that most typical smoke detectors are not rated for satisfactory operation at low temperatures. Consider Vesda or beam photometric detectors as have been used in some other low-temperature applications. If necessary, use rate-of-rise heat detectors, but be sure to locate them away from entry doors.

If not addressable, detectors should at least be zoned with one zone per vault space; vault spaces must not be grouped onto a single zone.

Analog detection should be considered to allow dynamic alarm thresholds, including a lower alarm threshold when the vault is unoccupied. The “unoccupied” mode might be triggered several minutes after the vault lights have been switched off.

18. FIRE SUPPRESSION. Due to the risk of freeze-up, if an automatic fire suppression system is used it should be a dry-pipe or preaction sprinkler system.

GAS SUPPRESSION. Due to the unusual requirement for tight construction for temperature and humidity, and the potential sprinkler protection for adjacent spaces, the prognosis for using a gas suppression system successfully might also be good. Consider using an inert gas system, such as the nitrogen system. Misting systems should not be used since they can be expected to form ice or water on the surface of collections stored in the vault.
SPACE LAYOUT AND FEATURES

19. WORK TABLE/INSPECTION WORK AREA. As may be further detailed in the
conservator’s report, the vault should have an area to inspect and work
with collections while keeping them at storage conditions to avoid
necessary post-conditioning and time out of storage.

20. CURRENT DRAWER STORAGE. While the current drawer storage cabinets might be
reused and put on movable shelving, this will cause space inefficiency,
additional handling, and not provide good isolation of off-gassing. As
discussed at the April 2010 site visit, the drawer collections should be
normalised into “shoe box” storage. This will allow storage on higher
shelving and remove the odd-sized cabinets to increase space use
efficiency. The boxes can be selected to provide additional adsorption of
compounds off-gassed, as well as provide better isolation of collections to
reduce the risk of cross-contamination. Boxes will also provide better
protection from any water intrusion, particularly compared to the cabinets
which would tend to collect and hold any water. It will also be easier to
treat collections if damaged.

21. SHELF HEIGHT. As discussed at the April 2010 site visit, the highest
usable shelf should be 72 inches to the shelf bottom, to allow easy reach
to boxes in storage.

22. SPACE DIVIDING. The interior wall and ceiling finishes can be aluminum or
a painted surface, where the paint has been approved by the project
conservator. The floor finish and structure should be coordinated with the
shelving, and should be similarly inert to off-gassing and resilient to
water and vapor.

23. ACoustIC ISOLATION. Though not a preservation or performance issue, if the
air handler room shares a wall with or is otherwise adjacent to a space
with low ambient noise levels, then the spaces should be acoustically
isolated. This would generally indicate double-wall construction, with an
STC of no less than 44, double doors with gaskets, and any heavy equipment
located on inertia pads with resilient mountings.

REFRIGERATION EQUIPMENT

24. COOLING MEDIUM. The cooling medium for the vault might be glycol or direct
use of refrigerant (DX).

HOT-GAS BYPASS OR STORAGE TANK FOR LOAD CONTROL. Each refrigeration
circuit should have either hot-gas bypass or a storage tank to allow the
compressors to operate at low-load conditions without short cycling.

As discussed at the April 2010 site meetings, the consensus was a
preference for a glycol/storage tank approach.

25. CONDENSER TYPE. The system might use air-cooled or water-cooled
condensers. Any connection to the campus HVAC systems, such as to the
chilled water, should not be made capriciously. Inadequate chilled water
can cause problems with the vault condensers. It is very likely that
service of the chilled water systems would not be coordinated with
operation of the vault systems and problems might be created. A more
independent system might be considered using separate rooftop air-cooled
condensers, with low-ambient controls, for the vault systems.
As discussed at the April 2010 site meetings, the consensus was a preference for an approach using the campus chilled water for condenser cooling, since it would have less disruption to the building and have less capital cost. However, continuous operation of the campus chilled water is required. If this cannot be assured, then separate air-cooled condensers should be used.

26. DOUBLE REFRIGERATION CIRCUITS. The vault should have double refrigeration circuits including separate compressors, and condensers. The circuits should be independent so that one may be fully serviced without disabling the other. This includes access to the equipment and piping. It is not uncommon that while one circuit can continue to function while the other is under repair, the repair work itself will require partial disassembly of the operative circuit to service the inoperative equipment.

REDUNDANT CAPACITY. If desired by the institution, the double refrigeration circuits might each be sized for 100% of design capacity. If not, the circuits should at least be designed at a capacity greater than 95% so that good conditions might be maintained with only one circuit operating. Typical capacities might be 60%, 75% or higher. The exact redundant capacity should be determined by the design firm based on nominal operating capacity at reduced load - each circuit should have sufficient capacity on its own to hold design conditions where outside air is closed off, lights and heater are shut off, and there is no entry to the vault.

27. DEFROST. If needed the cooling coil should have a defrost cycle possibly using an electric radiant heating element. Defrost should not be done by only heating the air with electric heating elements. The duration of any defrost cycle should be limited to no more than 15 minutes. (Temperature and humidity fluctuations of such short duration should not reach collections kept in storage boxes.)

Defrost should only be used as necessary and the system design should avoid freezing of the cooling coils as much as possible. This should be possible with sufficient air flow and removal of most moisture by the desiccant system upstream of the cooling coil.

28. STANDARD COMPRESSOR. The refrigeration system design should be based on a standard compressor that is readily available locally, such as from Copeland. The design should not be based on a special or modified compressor that has a long lead time for replacement regardless of a lower life-cycle cost.

HUMIDIFICATION EQUIPMENT

29. HUMIDIFIER. There will rarely be any humidification load on the system, so the vault humidifier should consume little or no energy when not being used. It should also have good part-load characteristics due to the low load conditions.

As discussed at the April 2010 site meetings, an electrode canister humidifier would be consistent with the campus maintenance experience. To extend the service life of the canister, the makeup water should be softened if available. A water softener should only be added to the project if there is a situation where the humidification demand is such that canister life is a concern.
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DESSICANT EQUIPMENT

10. DESSICANT DEHUMIDIFICATION - GENERAL DISCUSSION. See the Desiccant
    Dehumidification Systems Supplement in the appendix for a general
discussion of the application of desiccant equipment.

The selected desiccant system should have the following characteristics:

a. Type of Media: Silica gel.
b. Type of System: Rotary wheel.
c. Regeneration Heat Source: Campus steam.

11. DESSICANT PROCESS AIR DISCHARGE AND STRATIFICATION. Some vaults have had
    problems with thermal stratification, primarily due to the discharge of hot
desiccant process air directly into the vault - air which does not readily
mix with the cold vault air. To avoid this it is imperative that the
desiccant process air discharge be in the main vault air handler and
upstream of the cooling coil.

12. REDUNDANT DESSICANT UNITS. There is a benefit to using double desiccant
    units, each sized for 100% of the nominal operating load. These could be
independently operated and serviced to allow continuous
    dehumidification should one unit fail and need repair. Since there is a
    clear economy of scale to these units, the institution may wish to have
    this feature as an add-alternate due to the significant cost increase.

At the April 2010 site meeting the consensus was a preference for the
capital and space economy of a single desiccant wheel, since the campus is
already familiar with maintaining this type of equipment. If a single
    desiccant wheel is used, then the external monitoring detailed following
will be critical to early attention to and resolution of problems.

13. DESSICANT DEHUMIDIFIER FEATURES. The following should be required of the
    project desiccant system.

a. REGENERATION AIR MONITORING. The desiccant unit should have built-in
    ability to check the functionality of the regeneration air circuit.
    This can be as simple as dial thermometers downstream of the heater and
upstream of the wheel ('heated to' position), and downstream of the
wheel, or a microprocessor control system that shows regeneration air
    temperature, flow and heater operation. This temperature should be
be read directly at the unit, regardless of any remote monitoring.

b. INDIRECT REGENERATION HEATING. The regeneration heat should be
    indirect, either through a steam or hot water coil, or an indirect-
    fired natural gas or oil heater. Direct-fired natural gas regeneration
    should not be used because combustion by-products can be carried by the
    wheel to the process air stream, and direct-fired units are prone to
    heater firing problems.

c. AIR FLOW PROTECTION. The unit should have integral safety to disable
    the unit if process or regeneration air flows are deficient.

d. FILTRATION TO REMOVE DESSICANT MEDIA FINES. The engineer should
    consider the possible problems to the collections from the desiccant
media, such as fines or dust. These might reach the collections and
cause damage chemically or by abrasion. The collection spaces should
    be protected from the desiccant system media by appropriate filters to
    remove any media that might be carried by the air. If the size of the
media fines are known then filter should be selected to remove over 90% of the fines. If the size of the media fines are not known then a 90-95% ASHRAE Dust Sert should be considered by the engineer. In most layouts this filter will already be downstream of the wheel in the vault air handler and a separate filter is not required.

e. MONITORING INFORMATION. The system should monitor the following conditions, and regardless of local monitoring at the vault, they should be passed to and monitored by the campus BACS:

- Power on (enabled),
- Unit running (operating),
- Regeneration heat on (unless the react heater is a wild steam coil),
- Regeneration damper open,
- Regeneration fan on,
- Regeneration heater discharge ("heated to") temperature,
- Supply (process) air fan on,
- Face/bypass damper position,
- Any other status values available.

f. WARNING AND FAULT CONTACTS. The system should have a general "system fault" contact for connection to the campus BACS, indicating the system has disabled itself. In addition, consider requiring separate contacts or reading communication values to allow HVAC controls monitoring of the following faults:

- Regeneration over temperature,
- Regeneration motor overload,
- Regeneration outlet temperature low,
- Process motor overload,
- Wheel rotation failure,
- Any other faults.

Any warnings from the unit should also be read by the campus BACS.

g. GUARANTEE. The system should have a 12-month warranty from date of installation or operation. This should include field verification of performance problems by factory representatives. (This is important since in-situ flawed performance may require ad-hoc humidification for at-will testing of the unit under full load.)

h. SPECIFIC PERFORMANCE CURVE. This should be included in the wheel submittal to assure in-trouble shooting the systems and verifying performance for potential replacement under warranty.

34. TREATMENT OF DESICCANT REGENERATION AIR. It is common to give little concern to the source of the desiccant regeneration air since it is not directly used in the conditioned area. This is a misconception because the desiccant wheel can act as a transfer mechanism to bring regeneration air contaminants into the process air stream and into the conditioned space. Another more common problem is the deterioration of the desiccant due to contaminants in the regeneration air, usually damage from fine gout that can fill the desiccant micropores of adsorbent and absorbent media or from gaseous contaminants that can readily damage the chemistry of absorbent media.

Regeneration air should be filtered for particulates to the MERV-14 level unless it is drawn from an already filtered source.
In most cases it is more convenient and far less maintenance to draw the regeneration air from a space that is already filtered for particulates and gases than to provide separate filtration for the regeneration air. This might be nearby collection areas. Note well that the air system serving that area will need to be capable of the added makeup air to account for the amount of air drawn for regeneration. This may require increasing the size of that system’s outside air and filtration. This can work to an advantage in some cases where additional dried outside air is needed to meet space loads but must be relieved from the space; drawing the regeneration air from the return air in such cases can help balance air flows.

GASEOUS MEDIA

35. **GASEOUS MEDIA CONFIGURATION.** The removal of gaseous contaminants should be through the use of a granular bed or particulate media impregnated with carbon and other compounds. The use of "V-cell" type of systems should be avoided based on the other film storage facilities that had problems with such systems: granular media might be used in either 24” x 24” V-pencils, or in a vertical tube arrangement.

The major difference between media configurations will be the amount of active media in the filtration elements and their ease of maintenance, as previously discussed. Since contaminant loading is expected to be modest then the impregnated media, so is apparently the standard for some design-build companies, could be used. For flexibility in treatment media and capacity then the design should provide for at least two pass of media in the recirculated air stream.

36. **GASEOUS MEDIA TYPE.** The removal of gaseous contaminants should be through the use of at least virgin carbon. In a discussion with Mr. Chris Miller at Purafil, he indicated that at low temperature conditions much below 40 degF, particularly below freezing, that carbon activity might actually increase while oxidants like potassium permanganate may reduce activity due to a lack of free water. The use of carbon was also casually recommended by Mr. Nirmal Singh of Carox Chemical, who are the only manufacturer of reagent grade potassium permanganate (Carox) in this country.

37. **GASEOUS MEDIA LOCATION.** The media should be located at least in the mixed air or supply air stream, not just the outside air. The recirculated gas media should be effective on acetic acid and other problematic gases expected to be off-gassed from collections and housings in storage. Gas media in the outside air can be selected to remove the ambient pollutant gases, typically ozone, oxides of nitrogen, and sulfur dioxide.

**RELATIVE PARTICULATE FILTER LOCATIONS.** Note that the gaseous media should have at least a 30% efficiency filter located downstream so that any media fines might be caught. Note further that a MERV-14 or HEPA filter should be located upstream of the gaseous media.

Also see Gas-Phase Filtration Media and Technology in the appendix.

**CONTROLS, MONITORING AND ALARMS**

38. **LEAD-LAG CONTROL.** Each multiple or redundant system should operate in a lead-lag control mode unless the design firm has good reason to do otherwise. Each lead-lag arrangement should have a limit switch or cut-out.
switch, with a manual override, to swap the lead and lag systems. (An independent component should not be "held in reserve," as the unit may not operate if it has not been called to operate recently.)

39. HUMIDITY SENSORS. Consider finer humidity sensing, possibly using chilled-mirror sensors. In any case, the sensors should have a tolerance of no more than +/-3% RH, from 10% to 60% RH when operating at 30 degF.

40. BREAK-DOWN ALARM AND OPERATION CYCLE. The system should have sensors to determine when there has been a system failure. Separate temperature and humidity sensors in the vault should be used for alarms - the control sensors should not be used for alarms. Sensors should also be provided in the air handler and refrigeration systems to monitor conditions so that a failure can be detected before it causes vault conditions to deteriorate. Such sensors might include a flow or pressure switch on fans, an analog current sensor on the air handler fan to detect blocked coil/filter conditions, analog pressure sensors across filter elements, temperature or pressure sensors on the refrigeration circuit to detect refrigerant temperatures or pressures that would indicate an imminent failure. The deisicant units should have warning and fault contacts for their various components, and these should be integrated with the vault alarm/response system.

SINGLE FAULT. When a single fault in the system is detected an environmental alarm should be made.

SYSTEM FAILURE. When space conditions begin to deteriorate or a major failure is confirmed (such as zero current to the fan and zero pressure drops across the filters, or zero current flow in a compressor and refrigerant pressure loss) the system should not only issue an alarm but should shut down all system operations. This should include shut down of:

a. all loads inside the vaults including lights and door heaters;

b. the deisicant units which are a major source of heat when in operation;

c. the makeup/outside air system, with the outside air damper closed.

The air supply smoke damper and/or equivalent isolation dampers should close on the supply and return to isolate the vault space.

If the fault can be isolated to only a single refrigeration circuit then that circuit should be de-energized and the other circuit could remain in operation so long as the deisicant systems are still on-line. If the fault is with the air handler then all equipment should shut down so that existing conditions in the vault can be maintained.

Although beyond the control of the vault design, it is very important that the staff not enter the vaults until system operation is restored.

Each of the alarm sensors and scenarios should be demonstrated at the time of system commissioning for proper functioning.

POWER-FAILURE. The control system should also allow external triggering of the "failure" mode in the event of a power failure. Under such a condition the shut-downs noted above would occur for all systems.

POWER-FAILURE MODE OPERATION. The institution would like to provide continued vault operation under a power failure, depending on the electrical load on the emergency generator and general feasibility.
single refrigeration circuit and single dehumidification circuit could operate with lights, door heaters and outside air disabled. The air handler could operate at a reduced air flow (but not so low as to cause excessive frosting of the evaporator coil).

This reduced power mode should be detailed in the vendor's design submittal.

41. MONITORING. The vaults should be monitored through the control system's temperature and humidity transmitters. To assure reliable readings redundant temperature and humidity sensors should be used, and the sensors should be specifically voted to operate at the design temperature.

TREND LOGGING. Using the temperature/humidity transmitters the control system should be capable of keeping track of the vault temperatures and humidities at two minute intervals for at least 7 days, and should be able to plot the results or download the data to a spreadsheet for plotting.

As discussed at the April 2010 site meetings, the campus HVAC stop would tentatively provide the trend logging and monitoring through the campus Siemens system. This will require a Siemens connection to all necessary points, as generally indicated herein.

42. ALARMS. As discussed at the April 2010 site meetings, the vault conditions should be monitored and alarms made to the campus Thermal Energy Plant, when the following conditions are detected:

Humidity - Target 30 35% RH:
- Above 30% or below 35% - Maintenance response, with alarm look-back set at the discretion of maintenance staff;
- Above 40% or below 30% more than 2 hours - Call Library;
- Above 50% or below 20% more than 2 hours - Call Library, and shut down vault;
- Below 15% more than 20 minutes - Call Library, and shut down vault;

Temperature - Target 30 degF +/- 1 degF:
- Above 33 degF or below 27 degF - Maintenance response, with alarm look-back set at the discretion of maintenance staff;
- Above 40 degF 10 minutes* - Call Library, and shut down vault;
- Below 27 degF more than 2 hours - Call Library;
- Below 55 degF more than 8 hours - Call Library.

* This alarm look-back may need to be adjusted longer depending on operational experience with the vault as it is used.

43. WATER ALARMS. The vaults should have exterior and interior water alarms for immediate and accurate detection of any water risks. The water detectors should be located in expected water accumulation locations. In some cases gutters or drain pans may need to be provided for reliable activation of detectors.

For superior water detection, consider a continuous detection system, such as the system available from Reference 5, based on a tape or wire that runs the entire length of potential water intrusion areas. This type of system can locate the exact location of water exposure along the tape.

44. LOCAL VAULT CONTROL PANEL. Since the vault vendor is expected to provide their own package controls, this should include an always-on LCD/LED display panel in or near the vault entry. This should be in addition to
connections to the campus BACS.

VAULT VENDOR SUBMITTALS AND SERVICES

45. COST ESTIMATE. The cost for the vault project, including any suggested changes to reduce project costs.

46. DESIGN. The vault vendor should provide submittals including, but not limited to:
   a. Drawings at 1/4" scale or larger for plan, sections, elevations of the vault and any associated equipment:
   b. Details for floor, walls, ceiling, all edge conditions, penetrations, ducts, equipment (air handler, refrigeration equipment, etc.);
   c. Diagrams, parts list, and catalog cuts for all ducts, piping and wiring;
   d. Controls, with parts list, and catalog cuts for all equipment, proposed control sequences, reduced power mode (page 26), control wiring diagram;
   e. All other materials and components to be used, with specifications and catalog cuts.

47. SYSTEM OPERATION NOTES. How their systems and controls will achieve the target criteria should be well documented, including typical psychometric cases, to assist the engineer and commissioning agent understanding the system for proper operation.

48. EQUIPMENT OR EMERGENCY POWER. The equipment to be powered under emergency conditions should be specifically noted in the design along with final KVA or watts.

49. OPERATING COST. The vault vendor design submittal in response to the engineer's performance design should include projected operating costs, and any suggested options to reduce this cost.

50. OPERATING INSTRUCTIONS AND TRAINING. At completion, the vault vendor should provide a maintenance plan and owner's manual. The maintenance plan should describe typical preventive, and corrective maintenance procedures, as well as suggested re-commissioning of repaired equipment or systems. The manual should include schematics, equipment schedules, parts lists, suggested spare parts to stock (particularly for non-redundant systems), the sequence of operation for all modes, and suggested start-up and shut down procedures. (See Amon Carter Vault Checklists in the appendix.)

   The vault vendor should provide training for the campus maintenance staff. The training should be digitally recorded and preserved in CD or DVD format for campus reference.

51. COMMISSIONING. The vault vendor should coordinate with independent commissioning by the University's commissioning agent. See page 30.

PROJECT COST DRIVERS

The following aspects of this conservation environment project can be considered among the unexpected cost drivers on the project. It is important that the institution's architect and engineer and/or any construction estimators give full consideration to the costs of these particular aspects of
the project, to properly reflect costs for the institution, to avoid budget problems later from "unknown" costs.

1. GASEOUS POLLUTION CONTROL. The project budget should include funds for the selected gaseous pollution control equipment, or the provision of racks or frames for the addition of the equipment later. The budget should also include costs associated with the higher fan pressures required (fan, motors, etc.).

The typical planning budget for this aspect of a project is as follows:

Recirculated Air Treatment with two (2) passes of impregnated media: $0.50 to $1.00 per CFM
Outside Air Treatment with a vertical tube system (VTG): $5 to $10 per CFM

(please note that the "vertical type" filtration usually listed in the means cost data is not a "vertical tube system," and the price is too low.)

These budgets are for the filtration equipment only, and do not include the added fan horsepower.

2. PURGING AND SYSTEM BREAK-IN. These phases of the construction in preparation for occupancy can increase the project cost. (See later section on "Preparation of Collection Spaces for Occupancy.") The costs involved include the additional cost of implementing the purging (fans, air flow maintenance, added labor), and the potential added project time for system HVAC break-in before moving in collections.

3. NEW SHELVING SYSTEMS. These systems should be provided by a reputable vendor and should have a "powder coat" finish, usually a modest premium.

4. CONTRACT ADMINISTRATION SERVICES. The contract with the institution’s architect and engineer should include an appropriate amount of fees for contract administration services, including sufficient site inspections for preparation of non-conformance reports.

5. COMMISSIONING. The project budget should also support a system checkout as described in ASHRAC Guideline 1-1989, "Guideline for Commissioning of HVAC systems." This would preferably be provided by an outside commissioning firm. See following discussion on page 30.

6. PRE-MOVE CLEANING. The project budget should include the cost of having all the spaces cleaned with a HEPA vacuum just before occupancy.

7. COLLECTION CLEANING. The cleaning of the collection can be a significant cost and usually cannot be done by the institutional staff unless additional temporary staff and equipment are used. (See later section on "Preparation of Collection Spaces for Occupancy.")

SUGGESTED A/E PERFORMANCE DESIGN SPECIFICATIONS AND SUBMISSIONS

The University’s architect and engineer should consider providing the following documentation of their performance design and specifications for bidding and connecting the vault project. Much of this will require coordination with one or more candidate vault vendors. We will and will not provide. As discussed at the April 2010 meetings, the architect and engineer will need to fully design the vault connections to the building systems, architectural work...
in coordination with the vault installation, as well as the lighting, fire
detection and fire protection systems. Wherever project scope can be done by
the vault vendor or under general contractor (GC) work, GC work should be
preferred, so long as it does not compromise the vault integrity or
performance. In this way the University can have more direct control over the
design and construction.

1. PERFORMANCE DESIGN AND SPECIFICATIONS FOR VAULT. What the vault vendor
will need to provide in the project. This should include the performance
of the vault and other criteria to be met. It should also define the
division of work between the vault vendor and the GC.

2. ARCHITECTURAL WORK. The modification to the existing structure, floors,
walls and ceilings to accommodate the vault, and a finish schedule with
specifications.

3. SHELVING DESIGN. In coordination with one or more candidate shelving
vendors, expand on the shelving layout in the Wagner report to define the
shelving equipment and design details.

4. DOOR SCHEDULES. This is important to show the type of non-vault doors used
to isolate collection spaces. It is important to include gasketing
hardware types and door elevations.

5. MECHANICAL ROOM LAYOUT. Layout at 1/4" scale (or layout), with
application details, including space for all major equipment.

6. DUCTWORK LAYOUT. Basic duct layout, showing connections, penetrations, and
main ducts.

7. Piping layout. Basic piping layout, showing connections and main runsouts.

8. HVAC CONTROLS: SCHEMATIC, POINTS LIST & SEQUENCE OF OPERATIONS. Showing
functional elements, how they are connected to the vault controls.

9. DETAILS OF LIGHTING DESIGN. Consider developing the following details of
the lighting design to express the design intent:

   a. LIGHT LEVEL/UV FILTRATION PLAN/LAMP SELECTIONS. How lighting will meet
   light level and UV criteria, with typical fixture/lamp selections and
   application.

   b. STORAGE LIGHTING CALCULATIONS. Description of how the storage lighting
   treatment will provide adequate vertical illumination for the various
   storage and shelving conditions.

   c. SWITCHING. How the lights will be controlled.

10. EQUIPMENT ON EMERGENCY POWER. The equipment to be powered under emergency
    conditions should be specifically noted in the design along with rough KVA
    or watts.

    These should be provided in the design so that they may be coordinated with
    the program.

12. ELECTRICAL/WIRING SERVICES. Layout and equipment for the various
    connections to the vault and drops for selected services. (See page 17.)
13. SPECIFICATIONS ON DRAWINGS. At the April 2010 site meetings, Mr. Harrison emphasized that the campus prefers that project specifications be shown on the drawings. These should include the controls points list, sequence of operations, and overall design goals for the controlled parameters (temperature, humidity, filtration, etc.).

14. CAPITAL AND ANNUAL COST ESTIMATES. These should developed costs and budget allocation between systems (A/S/H/E/P), and estimate the annual energy and maintenance costs for the systems.

CONTRACT ADMINISTRATION SERVICES. The contract with the University's architect and engineer should include an appropriate amount of fees for thorough contract administration services, including site inspections for preparation of non-conformance reports. This will be essential so as to avoid the typical problems found in a small project which could lead to any number of fundamental flaws in the efficacy of the project.

CONSTRUCTION LOGISTICS AND PLANNING

The construction of the vault will require special attention to construction planning and logistics. The project should be planned and scheduled in considerable detail to coordinate the work of the vault vendor and SC, and to predict and minimize disruption to the Library and continuing operations. New construction materials may cause off-gassing problems that will need to be addressed in the scheduling and system design to prevent the need of moving the collections into a new space which is full of ambient solvent vapors and other volatile organic compounds (VOCs).

As appropriate, the project design and planning should also consider these constraints, and the architect and engineer should call for appropriate actions in the specifications; this would generally be expected in Division 1.

1. PRE-CONSTRUCTION MEETING. Since there will be several unique aspects to his project it may be appropriate to have the institution's conservator or curator give a brief overview discussion of the measures and precautions taken in the design to attend to these details for the benefit of the contractors.

2. CONSTRUCTION SUBMITTALS AND INSPECTION. This project will require a greater-than-normal effort in inspecting the construction as it progresses.

The following aspects of the design are critical and should be carefully watched, reviewed or coordinated with the program goals:

a. Gaskets. Gaskets should be properly installed and trimmed as required to provide a positive seal such that a 1" wide strip of 18-pound paper cannot be moved laterally along the gasket on the closed window.

b. Wood Products. Sheet materials delivered and used on site, such as plywood, particleboard and other sheet laminates should be checked to be sure they bear the APA trademark, or are otherwise confirmed to use phenol rather than urea formaldehyde. [An exception to this would be wood used as concrete forms.]

c. Paints. The painting contractor's submittals will contain the real substance of the paints to be used. The paints will have a major impact on the off-gassing and surface consolidation aspects of the project. Paints delivered and used on site should be checked to be
sure they are not alkyl or oil, unless approved as the only method of
priming certain materials (such as metal), and that they are consistent
with the materials specified.

d. Controls. Most of the actual controls design will be done by the
controls contractor so their controls submittals should be carefully
coordinated with the program goals noted herein. Many of these items
have little real cost and will not have a significant impact on the
project budget if caught early, but will have a significant cost if
retrofitted to the project.

3. CONSERVATOR MATERIALS APPROVALS. The project conservator should be
consulted for approval of any designated and questionable construction
materials.

4. REMOVING GASEOUS POLLUTANTS WITH CONSTANT PURGING. As part of a general
purging program for removal of gaseous pollutants, as soon as off-gassing
materials are used in the project construction areas these areas should
have constant ventilation. Major off-gassing sources are: tile, carpet,
carpet padding and vinyl baseboard; interior fabric finishes such as fabric
used on furniture; any rubber, silicone and vinyl, including tile and sheet
flooring; concrete and cementitious grouts; adhesives, sealants, mastics
and caulking; insulation on wiring and other plastic coatings; wood and
wood products including wood floors, walls and ceilings, plywood, particle
board, chip board and wood shave; finishes of paint, plaster, shellac and
varnish; drywall and plaster.

The construction areas should be negative pressured and exhausted. Exhaust
would also complement any pressurization for protecting other enclosures.
Areas; however, the construction areas may also require makeup air to keep
the rate of air exchange up. Heating may be required in winter, but the
ventilation must be maintained, and maintained 24 hours regardless of the
season.

This early exhaust is essential in removing off-gassed compounds from
construction materials before they have a chance to adsorb into other
construction materials. For all practical purposes, new or old drywall
will adsorb as much volatile compounds as become available from other
construction materials, releasing them over a much longer period of time.
Removing the compounds by ventilation and exhaust, before they have a
chance to reach any significant concentration, is a key to avoiding the
"flywheel" effect of the drywall and plaster.

The construction manager or general contractor should prepare a plan for
achieving effective purging. This plan should be submitted for review well
before the concerned construction begins. The plan should include measures
for periodic checking of the purging to assure efficacy.

PURGING PROTOCOL. The general contractor should develop a purging protocol
to be followed on the project to effect the intended purging of volatile
contaminants. Since this will involve the method of construction it cannot
be defined in the construction documents; on the contrary, it must be
developed by the contractor with approval by the design team and the
conservation environment consultant.

Important aspects of such a protocol should include the use of pedestal
fans and high volume vanes axial door/window fans (as used by firemen to
remove smoke) as soon as any compounds containing volatile contaminants are
used. The purging ventilation should provide no less than one-half air
change of outside air per hour and continue for at least 36 hours or until the off-gassing is complete, whichever is greater. To allow the protocol to be reasonably followed and checked by an owner's representative the ventilation equipment should be kept on the project site for the duration of activity of the trades that might need it; equipment that is not on site should not be considered applicable to the project. Protect ventilation equipment provided should have a minimum air volume capacity, such as 1/3 or 1/4 of the total project volume moved per hour.

ODDY TEST FOR MATERIALS. Materials should be tested with a conservator's "Oddy" test where necessary. The institution should be prepared to undertake such tests, either directly or under contract, as necessary.

5. PROTECTION OF AIR DISTRIBUTION SYSTEM. New fan systems should be protected from contamination with installation of high-efficiency filters when operated during construction. To protect the supply air distribution system, downstream of the final filters, be sure the final filters are installed and making rated pressure drop. In most cases, contamination results from either the filters not being installed at all, or being installed such that there is bypass. Each of these conditions can be detected by the differential pressure gauge across the filters. The rated pressure for these filters is usually 0.7" to 1.5". Unless numbers are known for a given filter bank, pressures less than 0.6" on MERV-14 filters are indications of bypass or missing filters.

PROTECTION OF EXISTING RETURN AIR DUCTS. Return ducts for the existing Library HVAC should be protected from contamination during the construction process as soon as dust is being generated. The return grilles need to be covered at least with 30% efficiency filters (such as sections cut from a Marr 16/20). These can be taped in place with duct tape. For long, continuous floor reveal returns, loosely fit cheesecloth into the slot, so it can be readily removed, yet fully intercepts the air; it need not be taped in place.

6. SEALING FOR INSECTS. Due to potential problems with insect infestations, all openings and penetrations made, or that become accessible in the course of the project, should be well-sealed, particularly around any concealed construction areas. These often cannot be detailed in the design but their sealing must be a diligent construction activity.

7. STARTUP. Certain precautions and measures should be taken in the startup phase, in addition or as part of any commissioning services provided by the design engineer, to protect the collections and the ongoing value of investment in the new building environmental system. These are described under "Preparation of Collection Spaces for Occupancy."

8. SYSTEMS DOCUMENTATION. The following should be considered to ensure adequate documentation of the intent and substance of the new systems.

a. SYSTEMS LABELING. Certain aspects of system labeling are critical to an effective and efficient maintenance program. These include:
   - All supply ducts and zone equipment should be marked in the fan room for the equipment or spaces they serve; a reduced floor plan should be affixed to each air handler, showing which spaces are served by which ducts;
   - All mechanical rooms should have a durable chart listing the valves in the rooms, with their number, function and size, with corresponding permanent number tags on the valves.
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D. SUBMITTALS. The facility should have on file a set of submittals for all equipment.

9. ON-SITE PARTICIPATION OF CAMPUS HVAC MAINTENANCE STAFF. The HVAC Shop Supervisor and HVAC tech assigned to the library should participate in the construction process. This will allow that person to become familiar with the new systems, and to build knowledge of other entirely undocumented and/or hidden aspects of the new construction.

PREPARATION OF COLLECTION SPACES FOR OCCUPANCY

The institution should consider steps to ensure the following procedures are incorporated in the construction and pre-occupancy phases of the project to prepare the vault for occupancy and use.

1. PURGING. New construction materials may release manufacturing chemicals for months or years after manufacture, and many materials release moisture for a similar period. Care should be taken in moving sensitive parts of the collections into newly constructed spaces to protect them from damage from initial construction off-gassing. Many photographic materials in the collections are particularly sensitive to gaseous compounds.

2. THE PURGING PERIOD AND TESTING. Conservatively, once the "new" smell disappears when you walk in each morning, the space is safe, but this may not be an effective way of predicting and monitoring the purging process. The use of gaseous contamination monitors should be considered by the institution for quantifying the rate of off-gassing and efficacy of the purging process.

TESTS. For most applications, the most meaningful monitors for purging will be those that test for total volatile organic compounds (VOCs) or representative VOCs. From a practical sense, the monitors need to be convenient for use on a weekly basis. This generally rules out the use of complex test equipment in favor of small passive detectors.

3. CHECK FILTERS. After purging, all air filters should be inspected and replaced if necessary. Air handling units should be reset to normal operation, and gaseous filter media should be installed if removed for purging. One month after new construction start-up, all particulate air filters on new equipment should plan on being changed.

4. COMMISSIONING. The project should preferably be commissioned before acceptance. The commissioning should be expected to follow ASHRAE Guideline 9-1, and include the following systems: security, refrigeration, general and panel construction, doors, fire detection, fire suppression, controls, alarms, and failure/shutdown sequences.

5. TEST AND BALANCE HVAC SYSTEMS. Before moving in the collections, if not provided as part of the vault vendor work, have HVAC systems, or at least the air side, formally tested and balanced. This is preferably done by a certified test and balance engineer, and is to confirm that the installed system delivers the supply air as designed.

6. BREAK-IN AND STABILIZE HVAC SYSTEMS AND ENVIRONMENT. After a satisfactory test and balance (by the vault vendor or independent firm), and before moving the collections into the new space, the system should be operated continuously to allow the systems and spaces to stabilize. During this
period the HVAC system should be fully operational. The collections should not be moved into spaces until space hygrothermograph charts, data loggers, or trend logs continuously read within criteria for that space for an extended period. This period should preferably extend over a period that will see the systems operate in the dehumidification mode. This generally indicates March through October. A poor break-in period would be November through February.

Note that the break-in can overlap with the purging process if gaseous pollution control is provided, so that contaminants can still be removed while the system is otherwise in the nominal minimum outside air operation.

7. **CHECK CRITICAL SYSTEMS.** The following critical systems should be checked before even considering moving the collections into the new spaces:

   - Alarms (page 28);
   - Failure Sequences (page 27);
   - Humidity Sensor Calibration/Operation.

8. **ENVIRONMENTAL STABILITY TEST.** As a reference for expected vault operation and planning for maintenance and failure contingencies, consider making a test, before occupancy, for the time it takes for the vault to vary from design conditions. Once the vault has stabilized for at least several days, disable the vault HVAC, possibly triggering (and testing) the programmed failure sequence (page 27). With continuous monitoring of temperature and humidity, see how long it takes for the vault to reach at least 80% of ambient temperature conditions, presumably an internal temperature of at least 50 degF, or a period of three (3) days, whichever occurs last.

9. **AIR LEAKS.** Note that after start up, air leaks may not be apparent until the system is shut down and the space warms. This is caused by hidden ice that forms at the leaks that only melts when the space warms to above freezing. Perform air leakage test if specified (see page 20).

10. **CHECK DRAINS.** Before collections are moved in, all condensate drains should be checked and confirmed to be properly connected, clear of construction debris and free-running. For emergency drains in or near collection areas that normally do not have water flow through them, consider priming the traps with mineral oil to prevent the traps from drying out and releasing sewer gases.

11. **CLEAN COLLECTIONS BEFORE MOVE-IN.** The collections can present a major source of initial particulate contamination to an otherwise clean, new collection space. The collections should be individually cleaned by a method approved by the project conservator. To reduce the recirculation of fine particulates, consider vacuuming with HEPA- or HSPF-rated vacuum cleaners, as available from references 6, 7 and others.

12. **PEEK-MOU-RIN CLEANING.** The construction project will be generally contaminated with fine dust from the work with concrete, drywall, plaster, wood and other similar materials. Much of the dust will be too fine to be caught by conventional vacuum cleaners - they will only blow the fine dust back in the air. Much of this dust is also not readily carried through the return air system, and thus the HVAC system's filtration will not be effective in controlling it.

   The only effective solution for this dust contamination is to have all the spaces cleaned with a HEPA vacuum just before occupancy. This is most
important in the collection areas; however, contamination from other areas is easily tracked into the collection areas. It is also important that this vacuuming be at the completion of all work that will generate dust, usually meaning that it is the very last task.

13. CLEAN SHELVING. The shelving may be covered with small (100 nm) particles from the concrete. These would only be blown around by a normal vacuum cleaner or simple dusting. Consider vacuuming the shelves with a HEPA or asbestos-rated vacuum cleaner, such as the Euroclean or Nilfisk discussed in Reference 7.
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SUGGESTED FURTHER WORK

The institution should consider pursuing the following steps to realize the
suggested cold storage for the collections.

1. REVIEW OF THIS SUGGESTED PROGRAM. The institution should review this
program for consistency with the institution's goals. The project
conservator should review this report for consistency with their
recommendations. As may be necessary, the report and program should be
revised to more accurately reflect the institution's needs and plans.

ISSUES TO BE RESOLVED BY THE INSTITUTION. The items noted in the "Issues
to be Resolved by the Institution" section on page 15 should be reviewed
with results forwarded to the architect and engineer or Garrison/Lull as
appropriate.

CONSERVATOR INVOLVEMENT. The institution maintain the services of a
conservator for further work on this project; see the Conservator
Involvement section of the program, page 13, for details.

2. ANALYSIS OF PRECEDENTS. As has been done to some extent already, consider
what lessons can be learned by direct observations of conditions at other
facilities that represent the character of cold storage for this project.
The institution should evaluate appropriate precedents, emulating
successful aspects and avoiding problematic characteristics.

3. GARRISON/LULL FOLLOW-UP MEETING. In the present scope of work,
Garrison/Lull will make a follow-up visit to the institution to discuss the
cold storage program in this report. This would also be to discuss any
subsequent activities as might be suggested above. Possible topics for
discussion at this meeting might be:

a. Report corrections or modifications to more accurately reflect the
institution's needs and plans, or to clarify issues raised;

b. Deliberation or conclusions on the Issues to be Resolved by the
Institution, as noted starting on page 15;

c. Questions about Suggested A/E Performance Design Scope and Submissions
starting on page 30;

d. Observations and conclusions from visits to any precedent projects.

The visit and one (1) report update will be for no additional fee; the
University will only be billed for the meeting travel expenses.

4. SPACE/SHELVING PLANNING. To provide the basis for the shelving design and
cost estimate from candidate vendors, the space and shelving layout should
be adequately developed. The present sketches in the Wagner report may
provide this. If so, then one of many cost estimates should be obtained.
If additional information is needed from the vendors, then this should be
developed.

5. DESIGN ENGINEER. Secure the services of a local engineer, and an architect
as necessary, to performance-specify the vault. This would not be the
design of the vault in detail, but a specification of the vault, and a
design of the necessary connections to the campus utilities (electrical,
chilled water, etc.). (See discussion starting on page 36.) From this
obtain estimates for the vault and the building utilities/AC work.

For additional fee, Garrison/Lull can evaluate and comment on the
performance specification of the vault for coordination with the goals and
guidelines in this report.

6. SECURE FUNDING. With the estimates in (4.) and (5.), secure funding for the project.

7. BID THE VAULT CONSTRUCTION. Once funding is in place, bid the CT work to local contractors, and bid the vault to several vault vendors. The University should make the CC and vendor selection and award the work.

8. VENDOR DESIGN SUBMITAL. The selected vendor would then prepare a detailed design for the vault. This would be reviewed and approved by the design engineer (5.), as well as any campus approvals.

For additional fee, Garrison/Lull will evaluate and comment on the vendor design submittal for coordination with the goals and guidelines in this report.

9. CONSTRUCTION. Prepare the spaces and install the vault as scheduling allows. The design engineer and campus facilities people should make periodic visits to review the construction character and progress.

For additional fee, Garrison/Lull will evaluate and comment on various submittals, and make at least one site visit to evaluate the construction in coordination with the goals and guidelines in this report.

10. ACCEPTANCE. The completed design would then be reviewed by the design engineer and campus facilities representatives for satisfactory completion.

For additional fee, Garrison/Lull will make a site visit to evaluate the construction before acceptance.

11. OCCUPANCY. Populate the vault with the collections. Ms. Wagner may help with this process.

For additional fee, Garrison/Lull will prepare a "Users Guide" to help the Special Collections staff and the campus facilities people know how to use and monitor the vault for the best performance and reliability.
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REFERENCES

Any mention of manufacturers, products or service providers in these references is only to provide a starting point for the work of others to secure products or services that have some of the characteristics of the references noted. This is not to be taken as an endorsement, approval or implied suitability or applicability for this project.

1. The Acetate Negative Survey Final Report: A Project Funded by the University of Louisville and the National Museum Act, by David Horvath, 1987, 51 unbound pages, $10 postpaid from the University of Louisville, Photographic Archives, Ekstrom Library, Louisville, KY 40292.

2. IPF Storage Guide for Acetate Film, James M. Reilly, Director, Image Permanence Institute, Rochester Institute of Technology, 70 Lomb Memorial Drive, Rochester, NY 14623-584, 716-475-5199. Based on laboratory research at the IPF, this guide includes a circular scale for estimating the probable life of new and degrading acetate film at different temperature and humidity conditions.


4. "ANSI Standard F11.43-1985 for Photography (Film) - Processed safety film storage."


6. Residential/consumer products for cleaning are available from:
   (a.) Allergy Control Products, CT, (800) 422-DUST. Manufacturer of residential filtration equipment, including supplemental bags for vacuum cleaners to remove finer particulates from vacuum discharge. They also sell HEPA vacuums.
   (b.) Priorities. 70 Walnut Street, Wellesley, MA 02181-2775; 800-853-9198, www.priorities.com. Vendor of various cleaning products including HEPA vacuums.

7. Nilfisk GS-60-1 HEPA-Filtered Vacuum, or Euroclean HEPA Filter Vacuum. These are industrial-grade vacuums which will positively remove sub-micron dust. The Nilfisk is about $800, and the more portable Euroclean HEPA Filter Vacuum is about $600. Although they use $2-5 paper bags to catch the large particulates, the replacement HEPA filters are expensive, often $200-200 for each filter. Nilfisk, with the most popular product line, can be reached at 3000 Technology Drive, Malvern, PA 19355. (610) 647-6420, Mr. John Summers. The Nilfisk is also available from Museum Services Corporation, 1107 East Cliff Road, Burnsville, WI 55337-184; 612-899-5199, fax: 612-899-5198, Peter Neckelburg, President. The Euroclean is available from Conney Safety Products, 3202 Latham Drive, Madison, WI 53711 (608) 236-2100.
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Notes on index: this index shows all occurrences of the indicated word, including occurrences with suffixes, thus "cool" lists every occurrence of "cooling." To locate combinations not listed, such as "condensate return," consider pages listed for both "condensate" and "return."

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IPF Acetate Film Guide Analysis 47
IPF Color Photographic Materials Storage Guide Analysis 48

Non-Project Specific Attachments
Desiccant Dehumidification Systems Supplement (8 pages)
Gas-Phase Filtration Media and Technology (4 pages)
Cassette Media Configurations (Diagrams, 2 pages)

Reference Documents (Not prepared by Garrison/Lull)
Amor Carter Vault Checklists (5 pages)
National Park Service Performance Specification for a Cold Storage
Vault to be Used for Film-Based Photographic Media (20 pages)
APPENDIX 1

Consultation Report and Conservation Environment Program for New Cold Storage
Prepared for the UT Arlington Library by Garrison/Lull Inc. 31 August 2010

FUGITIVE MEDIA REFORMAT COST Analysis

(*) Frame Totals based on “All Photo Collections” tab in fugitive media type
Summary by Frames collections inventory spreadsheet provided 5 April 2010.
Other values based on site discussions 15 April 2010.

Acetate B&W Media:

<table>
<thead>
<tr>
<th>Size</th>
<th>5x7</th>
<th>4x5</th>
<th>35mm</th>
<th>120</th>
<th>202</th>
<th>2MP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals</td>
<td>22,979</td>
<td>5,897</td>
<td>380.376</td>
<td>186,402</td>
<td>3,460,119</td>
<td>128,415</td>
</tr>
<tr>
<td>Cost to Reformat per Frame:</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td></td>
</tr>
</tbody>
</table>

Approximate Percentage of B&W Acetate “Fresh Media”:

<table>
<thead>
<tr>
<th>Size</th>
<th>74%</th>
<th>74%</th>
<th>20%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost to Reformat Totals for “Fresh Media”</td>
<td>$340,059</td>
<td>$87,276</td>
<td>$5,829,885</td>
<td>$1,326,214</td>
</tr>
<tr>
<td>$748,711</td>
<td>$1,416,470</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cost to Reformat “Fresh” Acetate:</td>
<td>$777,415,383</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approximate Percentage of B&W Acetate “Actively Degrading”:

<table>
<thead>
<tr>
<th>Size</th>
<th>26%</th>
<th>26%</th>
<th>10%</th>
<th>5%</th>
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</thead>
<tbody>
<tr>
<td>Cost to Reformat Totals for “Actively Degrading” Media:</td>
<td>$181,411</td>
<td>$30,564</td>
<td>$1,977,885</td>
<td>$372,084</td>
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<tr>
<td>$332,959</td>
<td>$1,440,013</td>
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<td></td>
<td></td>
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<tr>
<td>Total Cost to Reformat “Actively Degrading” Acetate:</td>
<td>$6,213,157</td>
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Color Chromogenic Media:

<table>
<thead>
<tr>
<th>Size</th>
<th>35mm</th>
<th>4x5</th>
<th>2x?</th>
<th>Slides</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Totals</td>
<td>1,052,140</td>
<td>55,384</td>
<td>224,027</td>
<td>11,763</td>
<td>123</td>
</tr>
<tr>
<td>Cost to Reformat per Frame:</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
<td></td>
</tr>
<tr>
<td>Cost to Reformat Totals:</td>
<td>$21,242,800</td>
<td>$1,077,660</td>
<td>$4,480,340</td>
<td>$238,660</td>
<td></td>
</tr>
<tr>
<td>$25,139,460</td>
<td>$2,480</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cost to Reformat Color Chromogenic:</td>
<td>$27,069,140</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

Values Approximated from Above and Used in IPI Guide Analysis:
Total Cost to Reformat “Fresh” Acetate: $75,000,000
Total Cost to Reformat “Actively Degrading” Acetate: $6,000,000
Total Cost to Reformat Color Chromogenic: $27,000,000
### APPENDIX 1

Consultation Report and Conservation Environment Program for New Cold Storage
Prepared for the UT Arlington Library by Garrison/Lull Inc. 31 August 2010

IPI ACETATE FILM GUIDE ANALYSIS by Garrison/Lull Inc. Date: 15-Apr-2010
for: UT Arlington Special Collections

**FILM PERMANENCE AS PROJECTED BY IPI ACETATE FILM GUIDE:**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Temp (deg F)</th>
<th>Humidity (%)</th>
<th>Fresh Film Life (years)</th>
<th>Degraded Film Life (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
<td>50</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>30</td>
<td>70</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>50</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>30</td>
<td>125</td>
<td>33</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>50</td>
<td>150</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>30</td>
<td>300</td>
<td>75</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>50</td>
<td>350</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>30</td>
<td>600</td>
<td>170</td>
</tr>
<tr>
<td>9</td>
<td>30</td>
<td>50</td>
<td>700</td>
<td>110</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>30</td>
<td>1500</td>
<td>397</td>
</tr>
</tbody>
</table>

**RATES OF COLLECTION LOSS BASED ON POTENTIAL ENVIRONMENTAL CONDITIONS:**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Temp (deg F)</th>
<th>Humidity (%)</th>
<th>Fresh Film Loss ($75,000,000 @ $6,000,000 per Year)</th>
<th>Degraded Film Loss ($)</th>
<th>Total Loss per Year</th>
<th>Total Loss per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
<td>50</td>
<td>$1,875,000</td>
<td>$1,290,000</td>
<td>$3,165,000</td>
<td>$256,250</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>30</td>
<td>$1,071,429</td>
<td>$420,000</td>
<td>$1,491,429</td>
<td>$124,286</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>60</td>
<td>$937,500</td>
<td>$603,000</td>
<td>$1,540,500</td>
<td>$128,375</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>50</td>
<td>$600,000</td>
<td>$180,000</td>
<td>$780,000</td>
<td>$65,000</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>30</td>
<td>$590,000</td>
<td>$240,000</td>
<td>$830,000</td>
<td>$69,167</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>50</td>
<td>$214,285</td>
<td>$120,000</td>
<td>$334,285</td>
<td>$27,857</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>30</td>
<td>$125,000</td>
<td>$25,000</td>
<td>$150,000</td>
<td>$12,500</td>
</tr>
<tr>
<td>9</td>
<td>30</td>
<td>50</td>
<td>$107,143</td>
<td>$25,000</td>
<td>$132,143</td>
<td>$11,012</td>
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<tr>
<td>10</td>
<td>30</td>
<td>30</td>
<td>$50,000</td>
<td>$15,126</td>
<td>$65,126</td>
<td>$5,427</td>
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**RELATIVE REDUCTION (INCREASE) IN RATE OF COLLECTION LOSS AGAINST BASE CASE**

**Base case:**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Temp (deg F)</th>
<th>Humidity (%)</th>
<th>Fresh Film Savings per Year</th>
<th>Degraded Film Savings per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
<td>50</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>30</td>
<td>$26,000</td>
<td>$26,000</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>60</td>
<td>$347,500</td>
<td>$347,500</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>50</td>
<td>$620,000</td>
<td>$620,000</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>40</td>
<td>$1,275,000</td>
<td>$1,275,000</td>
</tr>
<tr>
<td>6</td>
<td>30</td>
<td>30</td>
<td>$2,025,000</td>
<td>$2,025,000</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>20</td>
<td>$2,740,000</td>
<td>$2,740,000</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>10</td>
<td>$3,300,000</td>
<td>$3,300,000</td>
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</table>

The values above are derived from a simple linear analysis of the IPI guide life in years converted to an annual rate of loss (i.e., 10 years life = 10% loss per year). The $75 million and $6 million come from the fugitive Media Reformat Cost Analysis.
## APPENDIX 1

Consultation Report and Conservation Environment Program for New Cold Storage Prepared for the UT Arlington Library by Garrison/Lull Inc.  31 August 2010

IPI COLOR FILM GUIDE ANALYSIS by Garrison/Lull Inc.  15-Apr-2010

for: UT Arlington Color Holdings

**PERMANENCE PROJECTED BY IPI STORAGE GUIDE FOR COLOR PHOTOGRAPHIC MATERIALS, AND RATE OF COLLECTION LOSS BASED ON POTENTIAL ENVIRONMENTAL CONDITIONS:**

<table>
<thead>
<tr>
<th>Base Case Temp/Humidity (degF) (% RH)</th>
<th>Time Until 30% Dye Loss (years)</th>
<th>Loss per Year at Base Case: $77,000,000</th>
<th>Accumulated Loss or (Savings) Over 30 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  60  30  19</td>
<td>$1,421,053</td>
<td>$746,053 ($22,054)</td>
<td></td>
</tr>
<tr>
<td>2  80  30  50</td>
<td>$540,000</td>
<td>$135,000 ($4,500)</td>
<td></td>
</tr>
<tr>
<td>3  75  50  25</td>
<td>$1,980,000</td>
<td>$405,000 ($12,000)</td>
<td></td>
</tr>
<tr>
<td>4  75  30  70</td>
<td>$360,000</td>
<td>$289,000 ($88,678)</td>
<td></td>
</tr>
<tr>
<td>5  70  50  40</td>
<td>$675,000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>6  70  30  100</td>
<td>$270,000</td>
<td>$405,000 ($12,000)</td>
<td></td>
</tr>
<tr>
<td>7  65  50  50</td>
<td>$360,000</td>
<td>$105,000 ($3,000)</td>
<td></td>
</tr>
<tr>
<td>8  65  30  150</td>
<td>$180,000</td>
<td>$455,000 ($14,000)</td>
<td></td>
</tr>
<tr>
<td>9  65  50  80</td>
<td>$337,500</td>
<td>$337,500 ($10,125)</td>
<td></td>
</tr>
<tr>
<td>10  60  50  200</td>
<td>$108,000</td>
<td>$567,000 ($17,000)</td>
<td></td>
</tr>
<tr>
<td>11  55  50  125</td>
<td>$216,000</td>
<td>$459,000 ($13,700)</td>
<td></td>
</tr>
<tr>
<td>12  65  30  350</td>
<td>$77,143</td>
<td>$557,857 ($17,935)</td>
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<tr>
<td>13  50  50  150</td>
<td>$341,258</td>
<td>$520,714 ($15,621)</td>
<td></td>
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<tr>
<td>14  50  30  600</td>
<td>$45,000</td>
<td>$630,000 ($18,900)</td>
<td></td>
</tr>
<tr>
<td>15  40  50  350</td>
<td>$77,143</td>
<td>$557,857 ($17,935)</td>
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<td>16  40  30  1500</td>
<td>$18,000</td>
<td>$567,000 ($17,000)</td>
<td></td>
</tr>
<tr>
<td>17  30  50  800</td>
<td>$337,500</td>
<td>$641,258 ($21,237)</td>
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</tr>
<tr>
<td>18  30  30  3500</td>
<td>$7,714</td>
<td>$667,286 ($20,018)</td>
<td></td>
</tr>
</tbody>
</table>

The values above are taken from the IPI Guide. The values above are derived from a simple linear analysis of the IPI Guide life in years converted to an annual rate of loss (i.e., 10 years - 10% loss per year). The $27 million comes from the Fugitive Media Reformat Cost Analysis.
PRESERVATION REPORT
FOR THE
NEGATIVE ARCHIVES

SPECIAL COLLECTIONS
UNIVERSITY OF TEXAS AT ARLINGTON LIBRARY

BY
SARAH S. WAGNER LLC
29 August 2010
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<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
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<td>6-16</td>
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<tr>
<td><strong>Part I</strong></td>
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<td>6-9</td>
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<td>10-12</td>
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<td><strong>Part II</strong></td>
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<td>13</td>
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<td>14-17</td>
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## Appendices of Supplemental Information Requested by Staff

**Appendix 1 Specifications**
- Cold Vault Shelving Layout Options 1 & 2
- Sample Cold Vault Specifications (NPS)
- Thermmax vendor specification builder
- UTA Shelving Specifications (NPS)
- Vault Vendor List
- Vault layout diagrams

**Appendix 2 Freezer Price Quotes**
- BSI local Flammable Material Storage (FMS) freezer vendor contacts
- Flammable Storage Freezers (BSI) and product info
- Sears Frigidaire freezer product info

**Appendix 3 Storage Standards, Film Stability, Cold Storage Overview, and Handling**
- ISO International Storage Standards
- Discussion/background on film preservation and cold storage
- Negative Handling Health and Safety
- Nitrate Storage Requirements
- Cold Storage Packaging Guidelines
- Cold Storage Retrieval Guidelines

**Appendix 4 Digitization/Reformatting Issues**
- Discussion of standards, costs, and equipment

**Appendix 5 Texas Foundations that support Libraries, Archives and Museums**
SYNOPSIS OF KEY POINTS

UTA Library negative collections are an irreplaceable hard asset
- Permanent, irreplaceable record documentation of mid-Texas culture, history, and its natural and built environment.
- Collections are repository of last resort for some research subjects not duplicated by other repositories in Texas or elsewhere.

Cold storage is a relatively cost-effective preservation strategy for film collections
UTA requires cold storage for the long-term preservation of its film and color archives
- The proposed humidity-controlled vaults at shelved out may cost $350,000 to 500,000.
- Cold storage slows deterioration by hundreds of years including not just the film, but deterioration caused by non-archival housings or multiple films stored in one enclosure. Re-housing of collections into individual, archival envelopes is not required with cold storage, saving substantial material and labor costs plus additional space needs/costs due to increased bulk factor of 3 to 5 times with some collections (one collection could expand 3-5 times and take 200 years based on staff estimates).
- At the current documented rate of rapid deterioration, assume 10-20% of the films 70-90 years old will become unusable in the next 5-10 years, and a similar quantity each decade going forward.
- Two to three 20CF freezers (~$3000 each) can be used for long-term preservation of nitrate and for very deteriorated films that benefit from temperatures below 25°F.

Replacement costs of degraded films are exorbitant and meanwhile films would be lost
- Compared to digitization or traditional duplication, cold storage is the most cost-effective preservation method for film and color.
- Replacement (reformatting) costs are exorbitant compared to long-term maintenance in cold storage.
  - Digital conversion is ideal for access and distribution; at $20/item/scan it would cost $97M for the entire Ft Worth Star Telegram Collection (FWST, 4.9M images) and could take 25-30 years with multiple vendors plus unknown staff time. [See Appendix 4.]
  - If only the older, more acidic 4x5 films were duplicated, the cost would be $5.2M for FWST (260K images) plus a comparable cost to do all the films combined from the other collections. This “smaller” project of 260-520K images would take at least 5 years.
  - Digitization of only a culled selection of the most deteriorated negatives, perhaps 50-100,000 items would cost $1-2M and take at least 3 years.
- Collections would be lost to decay in the time required for digitization and in future decades.
- Due to the risk of electronic file corruption or total loss, the ongoing cost of electronic file maintenance for 10 years is estimated at 10-25% of initial capture cost or $0.50/image/year. Therefore, the original negative should be considered the preservation master file for any electronic version and be retained indefinitely in cold storage.

Current environmental conditions are inadequate and contributing to the deterioration
- The environmental conditions in the storage room, generally adequate for paper-based materials, are inadequate for permanent retention of inherently unstable film and color photographic media.
- Negative collections that are 50 to 90 years old show signs of moderate to severe deterioration as documented by staff with Acid-Detector Strips.
  - From 2004 to 2008, high levels of acidity in the FWST collection have risen rapidly from 0% to 100% of cabinets 1-7 and 45% overall. Clemons is 100% deteriorating.
- In most cases, the photographic print collections are in fair to good condition due to their relative stability compared to the films.
- A/V (video and magnetic tapes) is in fair-good condition, but machine obsolescence may prevent future playback if these materials are not reformatted onto current technology.
Stabilize the Archives Storage Room climate to 65-70°F if the RH can be maintained at or below 40-45%; All holdings would benefit by a lower temperature and relative humidity, e.g. approximately 65°F and 40%. Filter air to reduce dust and grime that accumulates on, and sifts, into boxes and binders.

Cold storage specifications developed roundtable meeting on 16 April 2010

- Acquire a cold storage vault in the library basement, Room B05, and a cool vault in Room B06
- This space has adjacent mechanical rooms, free and adequate clearance above the ceiling panels, adequate space, located within the Library building.
- The first vault option discussed at the meeting consists of
  - A large vault (650 SF) contained entirely in B05 would be set to (30-35°F /30%RH) in dedicated to film and color accessible through:
  - A smaller (200 SF) “A/V” vault situated in the adjacent room set to an intermediate climate (TBD 50°F /30%RH) for storage of A/V (magnetic media, newer films, prints) would provide a climate transition zone from the colder vault to ambient conditions.
  - Small office (100 SF, ambient conditions) through which access is gained to the intermediate vault and cold vault beyond.
  - Several freezer units located in the office would provide very low temperature storage for the oldest and/or most deteriorated films and color.
  - Total estimated LF would be 2000 for the large vault and 390 for the A/V vault. [See Floor Plan Option 1]
- A second vault option maximizes the storage space available in the staff break room by enlarging the office and the A/V vault.  [See Floor Plan Option 2]
  - Enlarge the A/V vault space to 340 SF (900 LF) by acquiring more of Room B06 (Staff Break Room) or taking it over entirely. This area could also serve as swing space for collections in B05 while the large vault is worked on or collections moved in.
- Due to expected time it will take to acquire cold storage, obtain freezers to preserve the most deteriorated negatives especially in the FWST collection.

Secondary Preservation Recommendations -

Re-housing Needs in anticipation of Cold Storage to maximize storage efficiency

- FWTS negatives from 1930s — digitize highly deteriorated film negatives before more disfiguring changes occur. Freeze these materials soon. There are 2 good housing/storage options:
  - Either replace the old FWST cabinets with new Russ Bassett cabinets similar to the ones currently used in later years then have all cabinets placed on compact rails in the new vault
  - OR re-box all FWST cabinets into “shoeboxes” in advance of cold storage then shelve temporarily on new fixed shelving in Archives Storage to compact required space needs.
- Where advised, re-box collections stored in cartons and oversize flat boxes into “shoeboxes”, document boxes, and custom-sized boxes in advance of cold storage to compact space needs.
- Package odorous boxes in vapor-proof bags to isolate and reduce vinegar odor in stacks.
- Magnetic media, CDs and DVDs, and more stable films should be stored in the A/V vault. Transfer VHS tapes to DVD for access.

Sources for Funding

A list of non-federal funding sources listed by state can be found in: Foundation Grants for Libraries, Archives, and Museums, 2010 Edition http://www.loc.gov/preserv/foundtn-grants.html Federal sources include: IMLS, NEH, NHPRC
INTRODUCTION

On site assessment and consultation
On 14-16 April 2010, Sarah Wagner, Principal of Sarah S. Wagner LLC, reviewed the negative holdings of the Special Collections in the University of Texas Library. Discussions were held with Ann Hodges, Special Collections Program Coordinator, Brenda McClurkin, Historical Manuscripts Archivist, and the lead consultant, William Lull, President of Garrison-Lull, Inc.

The consultation concluded with a meeting led by Bill Lull that included all stakeholders: Special Collections managers listed above, senior UTA Library management, UTA Facilities management and outside mechanical engineers and cold storage specialists.

This final meeting clarified the specifications for a future cold vault and mechanical requirements, and identified the appropriate space and associated retrofits. The vault specifications derived from this meeting have been addressed in a separate report written by Garrison-Lull.

Collections analysis
During the past four years, collection monitoring of acidity levels by staff using Acid-Detector Strips confirms the rapid increase in acidity. Some materials have reached the critical stage 3 where acid causes more rapid deterioration in a chemical feedback loop.

All major negative collections were reviewed at the container level. The negative holdings primarily consist of black-and-white negatives, in various formats with some color films and slides. Older materials display characteristics of rapid deterioration. There are later pockets of advanced deterioration due to unusually unstable types of film manufactured by Du Pont and others in the 1950s. Sheet films after 1960 are usually on stable polyester base and in good condition. However, in the 1960s small format sheet films and 35mm roll films begin to predominate both of which still are manufactured on acetate. Acetate usually begins to exhibit initial acid buildup and deterioration after 40-50 years in office conditions prior to reaching the critical stage.

Review of Previous Preservation Assessments Analysis
Recommendations provided on site are listed by collection in this report. These include boxing FWST, freezing portions of FWST, boxing other collections into more compact boxes.

Two previous consultant reports by Amigos from 2001 and 2005 were reviewed. Both reports emphasized the need for cold storage and note that the climate in the Archives could be improved. Staff concerns regarding some of the re-housing recommendations were discussed. Specifically, the Amigos recommendation to immediately re-house all negatives individually in archival enclosures, especially FWST, will become moot if cold storage is obtained. Cold storage will retard all chemical reactions, including those caused by contaminants in poor quality enclosures that fade or stain images.

The main report is supplemented by information desired by UTA located in the Appendices covering specific topics in more detail or providing reference sources.
Cold storage needed to preserve all film and color

The UTA Library Special Collections film archives are unique primary source documents, permanent record documentation of UTA programs, and a future resource for historical research. They represent permanent, irreplaceable record documentation of UTA, mid-Texas culture, history, and its natural and built environment. These collections are repository of last resort for some research subjects not duplicated by other repositories in Texas or elsewhere.

**UTA Library must pursue acquiring additional cold storage space to ensure the long-term preservation of these collections for this century and beyond.**

- The environment of the Archives Storage Room is substandard for cellulose-based films and color photographic media. *Older films have reached the stage of rapid deterioration, and have experienced rapid increases in acidity, as documented by staff from 2004 to 2008.* These films, that average 50-90 years old, are on the verge of suffering irreversible, disfiguring physical changes. Negatives and color photographs made in the last 30-40 years will also start to deteriorate in ambient storage conditions within a decade or two. [See Appendix 3 for discussion of film deterioration.]

- International Standards Organization recommends cold storage for the extended term storage of permanent film and color media and cool storage for magnetic media (audio, video, data tapes) that also benefits from cool dry storage. [See Appendix 3 for ISO standards.]

- Immediate short-term options for the most deteriorated films (e.g. FWST) include purchasing several commercial or scientific freezers for use in the Archives. These freezers would be retained for these materials after a cold vault is built for very low temperature storage of the most acidic films.

**Only cold storage provides long-term preservation/permanent retention**

Research in the past 20 years by the Image Permanence Institute (IPI) and others confirm that cold storage is the most cost-effective preservation measure. As shown in Table 1, lowering the humidity from 50% to 30% at room temperature can double the life expectancy of film, while lowering the temperature has a far more dramatic effect on increasing film and color life expectancy. [See Appendix 3 for discussion of cold storage, film stability, and time-out-of-storage information.]

<table>
<thead>
<tr>
<th>Environmental Conditions</th>
<th><strong>Years to Significant Change</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature °F / %RH</td>
<td></td>
</tr>
<tr>
<td>75°F/50%</td>
<td>25</td>
</tr>
<tr>
<td>75°F/30%</td>
<td>50</td>
</tr>
<tr>
<td>65°F/50%</td>
<td>70</td>
</tr>
<tr>
<td>65°F/30%</td>
<td>150</td>
</tr>
<tr>
<td>35°F/50%</td>
<td>600</td>
</tr>
<tr>
<td>35°F/30%</td>
<td>2000</td>
</tr>
<tr>
<td>5-10°F / 50%</td>
<td>6000</td>
</tr>
</tbody>
</table>

**Planning for the cold vault**

The Library has an ideal space available for a cold storage vault: B05 (current Special Collections Storage) and B06 (large staff break room). During the round table discussion on 16 April, a layout was
proposed for this site and vault specifications drawn up (see Lull Report for vault specifications). General agreement was reached among all stakeholders that:

- Cold storage is needed based on expected loss rates in the collection,
- Preferable to more expensive reformatting costing millions [see Appendix 4 for digitization costs],
- Funding-raising should begin based on a projected cost estimate of $300-500,000.

Subsequent to that meeting, shelving layouts were submitted to UTA by Sarah Wagner. The estimated 2400 LF of the new compacted cold storage vault should meet the current space needs (2280 LF) and some future growth. Current requirements will diminish some once FWST is re-housed into more efficient Russ Bassett cabinets or “shoeboxes” (~4 boxes or 4 LF/running LF). The re-boxing of other collections now stored in FRCs and other oversize boxes will also reduce the current total LF required.

Although procurement of a cold vault will be difficult with current state budget constraints and the impact of a poor economy on fund-raising, planning can begin now based on the parameters selected on April 16, 2010. [See Appendix 5 for Texas foundations and a link to a national guide.]

The desired timeframe for planning and final construction should be within 2-5 years, and no later than 10 years in order to minimize loss of collections.

Cold vault location and layout

The new cold storage facility would be located within the Library building in the basement, Room B05, and extend into the staff break room in B06. It was determined that this space has the necessary adjacent mechanical and utilities, free and adequate clearance above the ceiling panels, adequate space for the storage needs. [A generic shelving specification for cold vaults is provided in Appendix 1.]

- The first vault option [Floor Plan Option 1] discussed 16 April consists of
  - A large vault contained entirely in B05 set to (30-35°F /30-35%RH) for film storage. The 650 SF space would have approximately 2000 LF of 7-tier compact shelving.
  - A smaller vault attached to the cold vault set to an intermediate climate (50-55°F /30-35% RH) for storage of A/V (magnetic media, newer films). This vault would provide a climate transition zone between the cold vault and ambient office conditions. The 200 SF space would have 390 LF of compact shelving.
  - A small office (ambient conditions) through which access is gained to the intermediate vault and cold vault beyond. This office would 100 SF of space, with space for stashing carts, 2 freezers, and one desk outfitted with computers, scanner and phones.
  - Several freezer units located in the office would provide very low temperature storage for the oldest and/or most deteriorated films and color.

- A second design option would enlarge the storage space, utilizing more of B06, by doubling the size of the office and the A/V vault. [Floor Plan Option 2]. **Since space is extremely limited in the Library, this maximizes storage space from an under-utilized break room (B06). This option should be seriously considered as part of the project now and built out later as funds allow.** This area could be taken over as swing space for collections currently stored in B05 during construction, before these collections can be moved into space vacated in the Archives Storage Room. Option 2:
  - The same large vault in B05 listed in Option 1 above.
  - The A/V vault would be 340 SF and have 900 LF of compact shelving.
  - The office would be 170 SF of, with space for stashing carts, 3 freezers, and two desks outfitted with computers, scanner and phones.
APPENDIX 1

OPTION 1 LAYOUT FROM 16 APRIL MEETING

OPTION 2 LAYOUT PORPOSAL USING MORE OF B06 SPACE
Immediate freezer storage required for endangered films

Due to expected time it will take to acquire cold storage, *freezers should be obtained immediately to preserve the few pockets of severe negative deterioration, especially in the FWST collection.* These freezers should be retained after the vault is installed to provide very low temperature storage for vulnerable films and kept in the office area adjacent to the vault. In the interim, the freezers should be located in the Archives Storage Room, perhaps in the location of the FWST cabinets that they will be supplanting.

Require Flammable Materials Storage (FMS) Freezers for mixed nitrate and acetate

FMS freezers are recommended due to the presence of nitrate film intermingled with acetate in the collections dating from the early 1930s. These scientific freezers also have a far more efficient storage capacity than household freezers.

Local supplier of freezers

A firm located in Stafford, TX, Biomedical Solutions (BSI), has provided estimates for the flammable storage freezers (FMS). The BSI quote for both a 17CF and 20.7 CF FMS freezers are attached and range in price from approximately $3000.00 delivered for the larger model. A minimum of 40 cubic feet (CF) cold storage in needed, and 60CF is preferred. This represents two to three 20 cubic feet flammable storage freezers (FMS units). [Frigidaire (Model FKFH21F7H) frost-free household freezer available at Sears costs ~$700.00 and is a less expensive option, but does not have spark-proof interiors.][See Appendix 2 for quotes.]

Nitrate storage limits

The number of negatives in 50 lbs of film ranges from 7000 for 4x5 format to 60,000 for the 2-1/4 x 3-1/2 format. [See Appendix 3 for weights of nitrate film formats and information on nitrate storage.] The early FWST negatives are a mix of these two formats with an estimated 2400 4x5s and another 2500 4x5s in the Clemons collections, well under the weight limit. The first three cabinets of FWST contain the equivalent of 40-50 “shoeboxes” each. Each 20CF FMS freezer might hold 40 boxes or probably slightly less than one cabinet (space is lost to door shelves that are too narrow for “shoeboxes”). Three freezers would cost about $9K delivered from the local dealer.

Monitoring freezer climates

Freezers should be hooked into the building’s HVAC central station monitoring system, or if that is not possible, auto-dialer data loggers or wireless alarm sensors should be purchased for each freezer. The auto-dialer will telephone either an archivist or the building facilities in case the unit possibly malfunctions in a way that heats up the interior, requiring it to be turned off promptly. Auto-dialers cost $200-400.00 each. Wireless sensor units linked to a central station are more expensive, e.g. $800-1200.00 installed. Temporary loss of power in a freezer unit is not dangerous because the interior temperature of the unit will slowly rise, eventually matching ambient conditions only if the power outage is long enough or the unit is opened.

Vapor-proof packaging required for freezer storage

The use of freezers will require vapor-proof packaging to protect the materials from moisture within the unit, from moisture condensation when the unit is opened, and from condensation when items are removed to office conditions for warming prior to use. [See Appendix 3 for discussion of packaging procedures, guidelines for retrieving items in freezer storage, etc.]
**APPENDIX 1**

**Impact of cold storage on access**

Immediate access is limited in all cold storage options due to the need to allow the materials to warm to room temperature prior to most use (reference, scanning). A humidity-controlled vault has been selected as the preferred option because it allows for review of items within the vault and does not require special sealed packaging or cabinetry. This option is the most feasible for the large, high use UTA. Simple freezers and freezer vaults without humidity control require labor-intensive vapor-proof packaging or expensive sealed cabinetry.

**Retrieval procedures**

Most cold storage situations require that items be placed in plastic bags prior to removal from the cold vault when brought into ambient office conditions to protect items from moisture condensation. The UTA A/V vault is set at an intermediate climate to permit “staging” that does not necessitate bagging when going from the cold vault to the intermediate vault. *However, bagging will be required most of the time when going from the intermediate vault to the office due to the high ambient RH conditions in the basement 50-70%.* **Bagging will be required when the RH is greater than 53% with the conditions selected for the UTA vaults.** (Bagging is always recommended as a precaution). [See Appendix 3 for procedures to safely retrieve materials from cold storage.]

**Update catalog records for collections in cold storage**

Catalog entries should be annotated to alert researchers to the fact that same-day access will be delayed to the afternoon with morning pulls and appointments are recommended so that materials can be pulled the evening before to allow access the next morning.

**Minimize “time out of cold storage”**

Time spent at room temperature offsets the time spent at cold temperatures diminishing its benefits. If only a few items are needed from a box for extended periods, the box should be placed back in cold storage after the requested items are pulled so that the entire contents do not lose the benefits of cold storage. Ideally, digital masters should be made for high use materials as the items are requested, thus generating a copy available for the next request. Topics of high interest or research value can be duplicated in advance as budgets allow. [See Appendix 3 for a time-out-of-storage table].
Improve Climate in the Archives Storage Room

Climate does not meet standards for archives storage

The environmental conditions in the archives storage room (see Table 2) deviate from preferred environmental specifications for archives storage.

- The National Institute of Standards Organization (NISO) recommends a maximum temperature of 65°F and an RH of 35-50% for permanent paper records storage;
- The International Standards Organization (ISO) specifications for photographic media recommend a similar cool/dry climate for black-and-white prints and cold storage for color and films. [See Appendix for NISO and ISO standards].
- ISO 18934 lists climate ranges acceptable for archives where different types of media are stored within the same area, necessitating a compromise between ideal ISO conditions and the special physical and chemical requirements of different media [see Table 3 below].

Possible short and long term improvements in storage room

There may be few options available to make environmental improvements to the current storage room. Short-term solutions that might be feasible include adding de-humidifiers to reduce the relative humidity in summer months and an air filtration unit with HEPA activated charcoal filter to reduce acidic gas odors from decaying film and dust/grime. An HVAC engineer may be able to advise on:

- Options for lowering the humidity in the warmer months.
- Adjustment of air duct dampers to decrease heat output into the room in winter months, and increase cooling in summer months (without raising the RH).
- The ability to additional filters in the air handlers or stand-alone room units.

Modest environmental improvements have large benefits in the Preservation Index (PI)

As seen in Table 2 below, even modest climate improvements can have a dramatic effect on the Preservation Index (PI), an indication of how long it will take for materials to advance to a more deteriorated state and an indicator of deterioration rates in different climates. The Preservation Index (PI) was developed by the Image Permanence Institute website [www.imagepermanenceinstitute.org](http://www.imagepermanenceinstitute.org).

Incremental improvements may ensure that less stable record materials (for example, photographs, magnetic media) survive additional years with less damage until there are resources for major environmental improvements. Small groups of the oldest and most deteriorated negatives can be stored in freezers until a new facility is constructed, and retained thereafter for very-low temperature storage.

<table>
<thead>
<tr>
<th>Seasonal Extremes</th>
<th>Current Variable Climate (2005 Data)</th>
<th>Condensation from 55 °F vault occurs at 68 °F /51%</th>
<th>Current PI Average</th>
<th>Improved Stable Climate w/ set point Temp °F and RH</th>
<th>Improved Stable PI possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Archives</td>
<td>66-72°F / 25-48 % Ave = 71°F / 36% RH</td>
<td>Only bag if RH &gt; 51%</td>
<td>50</td>
<td>68°F/35-40%</td>
<td>62</td>
</tr>
<tr>
<td>Summer Archives</td>
<td>67-75°F / 47-62% Ave = 71°F / 53% RH</td>
<td>Always bag RH =/&gt; 51%</td>
<td>32</td>
<td>70°F/45-50%</td>
<td>42</td>
</tr>
<tr>
<td>Current Average Annual PI</td>
<td>41</td>
<td>Possible Average PI</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter B05 Ave</td>
<td>68-74°F / 24-63% Ave = 71°F / 43% RH</td>
<td>Usually bag RH &gt;51%</td>
<td>41</td>
<td>New cold vault 30-35°F /30-35%</td>
<td>1000</td>
</tr>
<tr>
<td>Summer B05 Ave</td>
<td>68-72°F / 51-70% Ave = 71°F / 60% RH</td>
<td>Always bag RH =/&gt; 51%</td>
<td>26</td>
<td>New cool vault 50-55°F /30-35%</td>
<td>225</td>
</tr>
<tr>
<td>Current Average Annual PI</td>
<td>&lt;37</td>
<td>Possible Average PI</td>
<td>200-1000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* These calculations are based on 2005 data and may not reflect current conditions. Actual PI for current conditions will be LESS because poor conditions are weighted more than good ones in calculating PI; PI is not based on a simple average of the range as was done for illustration here.
## Table 3 Climate Recommendations Based on Media from ISO 18934 Mixed-Media Archives Storage

<table>
<thead>
<tr>
<th>Condition</th>
<th>Glass plates</th>
<th>Nitrate&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Acetate&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Polyester</th>
<th>Photo prints</th>
<th>Electro-photographic, dye sub, ink jet</th>
<th>Magnetic</th>
<th>CD, DVD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Room</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>16 °C to 23 °C</td>
<td>Fair</td>
<td>No&lt;sup&gt;c&lt;/sup&gt;</td>
<td>No&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Good&lt;sup&gt;g&lt;/sup&gt;</td>
<td>No&lt;sup&gt;d&lt;/sup&gt;</td>
<td>No&lt;sup&gt;h&lt;/sup&gt; to good</td>
<td>No&lt;sup&gt;c, e&lt;/sup&gt;</td>
<td>No&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>16 °C to 23 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>60 – 74 °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>30 - 50 % RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td><strong>Cool</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>8 °C to 16 °C</td>
<td>Good</td>
<td>No&lt;sup&gt;c&lt;/sup&gt;</td>
<td>No&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Good</td>
<td>No&lt;sup&gt;d&lt;/sup&gt;</td>
<td>No&lt;sup&gt;h&lt;/sup&gt; to good</td>
<td>No&lt;sup&gt;c, e&lt;/sup&gt;</td>
<td>No&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>47 - 60 °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>30 - 50 % RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td><strong>Cold</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>0 °C to 8 °C</td>
<td>Very good</td>
<td>Good</td>
<td>Good</td>
<td>Very good</td>
<td>Good&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Very good</td>
<td>Good&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Good</td>
</tr>
<tr>
<td>32 - 40 °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>30 - 50 % RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td><strong>Sub-zero</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>−20 °C to 0 °C</td>
<td>Very good&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Very good</td>
<td>Very good</td>
<td>Very good&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Very good</td>
<td>Very good</td>
<td>Very good&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Very good</td>
</tr>
<tr>
<td>−4 – 32 °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
<tr>
<td>30 - 50 % RH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B&amp;W</td>
<td>Colour</td>
<td>B&amp;W</td>
<td>Colour</td>
</tr>
</tbody>
</table>

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<sup>a</sup> Shall be stored at subzero temperatures if there are advanced signs of decay, such as discoloration, out-gassing, rusted cans. Brittle film base or image deterioration.

<sup>b</sup> Brittleness or delamination are possible with older plates.

<sup>c</sup> May result in base degradation.

<sup>d</sup> Image fade or colour balance shift may occur for chromogenic colour, thermal dye transfer and some ink jet images. Room conditions are good for electrophotographic, pigment (carbro), dye imbibition (dye transfer), silver dye bleach and dye/silver diffusion transfer (instant prints).

<sup>e</sup> Degradation of magnetic layer binder is a concern.

<sup>f</sup> Lubricant separation from binder is possible.

<sup>g</sup> Image change may occur if improperly processed or stored in enclosures that emit peroxides.

<sup>h</sup> Staining, yellowing, and dye migration are potential problems.

<sup>i</sup> Delamination is possible with some optical discs.
Review of Previous Preservation Assessments

Two previous consultant reports by Amigos from 2001 and 2005 were reviewed during the site visit. Both reports recommended improvements in the Archives overall environment, in addition to cold storage. Staff concerns regarding some of their storage recommendations were discussed. Different recommendations provided on site are listed by collection in this report.

Practicality and need for previous re-housing recommendations

Of most concern to staff were the following two recommendations:

- Undo/redo the previously recommended practice of sleeving negatives in Mylar inside paper envelopes (concerns about films “marinating” in acids).
- Re-house all negatives individually in archival envelopes, especially FWST (standard preservation).

Both “issues” will become somewhat moot if cold storage is obtained. Re-housing can always be done at a later date once collections are stabilized by cold storage.

Cold storage will retard all chemical reactions, including those caused by acidic items being enclosed in a somewhat impermeable housing.

- It is too time-consuming to undo previous efforts that overall did improve the housing of a collection. Scarce labor and supply budgets are better spent elsewhere. This is a situation of diminished returns.
- The presence of a polyester sleeve inside the envelope is not a major contributor to the deterioration of these negatives compared to the climate. The concern about “marinating” the film inside its own “juices” inside the sleeve is based on accelerated aging studies. This consultant has not observed differences between negatives re-housed decades previous in plastic pages, polyester sleeve inserts, or paper envelopes.
- IPI research showed that there were not substantial differences between paper (buffered or not) plastic (polyethylene or Mylar), and Tyvek enclosures on film acidity. Climate does have a substantial effect on film life.

Cold storage will retard all chemical reactions, including those caused by contaminants in poor quality enclosures that fade or stain images, or by acidic films stored in contact with each other.

- The degradation caused by storing multiple acidic negatives within one enclosure will also be retarded in cold conditions. Although not ideal, this situation is akin to motion picture and other wound films on reels.
- The degraded films are probably more acidic than their non-archival paper envelopes at this point. Individual enclosures do facilitate retrieval, organization, and physical control while providing some benefit at room temperature storage by separating acidic film from itself. Replacement with buffered paper enclosures has negligible impact on the extended film base longevity compared to cold, dry storage. New, buffered paper enclosures will last longer in contact with acidic film at room temperature.
- The priority for re-housing should be replacement of damaged, non-functional enclosures or those in danger of losing information due to brittleness and breakage when handled. Smaller groupings of films in more envelopes would also help with out dramatically bulking up storage requirements.
- Individual enclosures for FWST could bulk the collection by a factor of 3-5. Staff has estimated that re-housing would take 200 years. Resources are better spent on freezer storage for the older films and obtaining a cold storage vault for all of the film and color holdings.
- The act of re-housing does “air out” films with an associated short-term drop in acidity. BUT this also causes a well-known effect whereby the aired film spontaneously buckles and channels within hours of being removed from its original enclosure. The same response can occur during scanning.
- Cold storage will buy time to digitize collections at which point selective re-housing could be performed along with culling.
APPENDIX 1

Specific Preservation Recommendations by Collection

The following long-term preservation recommendations for re-housing and access copies assume that all of these film and color collections will be placed in cold storage.

Fort Worth Star Telegram 1920s – 1990s
4.8M total negatives, 2400 nitrate 45% degrading
Estimated LF= 1670 = ~500 LF after re-boxing in “shoe boxes”, probably 6-800LF shelved??
Stored in metal cabinets: 2-rows/drawer in inefficient old dilapidated cabinets and 3-rows/drawer in efficient newer good condition Russ Bassett cabinets. Original paper envelopes are labeled; envelopes contain newspaper clippings. Multiple negatives are in each envelope varying in quantity from a few sheets to ½-inch thick batches. Some glassine; later films have plastic lab sleeves and sturdy envelopes.

- Limit off-site use by the newspaper company/donor (a requirement once in cold storage). Require the newspaper company/donor to share their scan files.
- Upgrade housing:
  - Either replace older cabinets with Russ Bassett type and place cabinets on compact rails in new vault with shelving above; if new cabinets are used, distribute items to reduce overcrowding.
  - OR re-box FWST cabinets into “shoeboxes” in advance of cold storage. If re-boxed, shelve temporarily on new fixed shelving in place of the cabinets to compact required space needs. [This shelving may also hold current B05 collections to free that space in advance of the cold vault construction.] Use Microchamber boxes with the activated charcoal liner for odor control.
  - If re-housed in 4x5 “shoeboxes” need 1800-2000 boxes (~1LF/box). Cost=$10-15K. Stack 2 “shoeboxes” high, or ~4 boxes/CF = ~4LF/~1LF = ~500 LF
- Freeze the contents of first several cabinets before more disfiguring changes occur. The first 1-3 cabinets are a priority, although the first 6 have high acidity. Each of these 9-drawer cabinets holds the equivalent of about 42LF or ~45 boxes/cabinet (films are transferred directly to boxes without individual re-housing). Each 20CF FMS freezer might hold 40 boxes or probably slightly less than one cabinet (space is lost to door shelves that are too narrow for “shoeboxes”). Three FMS freezers would cost about $9K delivered from the local dealer. The Sears Frigidaire freezer model would cost 2-3K, but is not spark-proof inside. [Clemons and Davis nitrate require freezing also].
- Do not rush to individually re-house the films in envelopes—there will be little added benefit with cold storage except physical control, and the labor has been estimated to be 200 years.
- Investigate reducing the number of films in each envelope by adding more envelopes to break up large groups; replace damaged envelopes; add some Microchamber interleaving paper between films within envelopes as possible; and interleave the newspaper clippings. Continue routine of preservation photocopying of clippings as items are requested.
- Do not segregate by format into parallel series—items currently fit inside 4x5 envelopes and should be retained in this archival arrangement. If feasible, nitrate should be segregated or individually sleeved or interleaved to separate from adjacent films; cold storage will mitigate nitrate interactions. **Segregate highly deteriorated (stage 4-5) nitrate and arrange disposal after digitization.**
- Digitize films based on priority of deteriorated nitrate and acetate or high use rates. Traditional duplication onto film is still done by Chicago Albumen Works [www.albumenworks.com](http://www.albumenworks.com) although appropriate duplication films are becoming scarce and of unreliable quality. Film duplicates would require scanning for access because researchers will prefer a digital file to gelatin silver print and there are few traditional printing labs that can still do this work.
- House 8x10 and larger glass plate negatives vertically in standard size negative boxes.
APPENDIX 1

W.D. Smith
190K negatives, 0 nitrate, 5% degrading # 4x5 #8x10
Estimated LF=256 220-232 LF shelved re-boxed into 9x11x5 boxes

A third of the collection has been re-housed with individual 8x10 archival envelopes and 8x10 boxes, while 2/3 remains in FRC cartons.

- Complete this re-housing project in order to standardize the boxes and slightly compact the collection in advance of cold storage. Approximately 360 more boxes needed. At the very least transfer 8x10 films still boxed in FRCs to the 9x11x5 boxes and replace envelopes later (again, not as crucial once in cold storage). Later 4x5 films and small format sizes could be boxed in “shoeboxes” or placed in polyethylene “pages” (e.g., Printfile) and boxed as above.
- Place odorous boxes into Static Shield re-closable bags.
- The ink jet printing is not a “harmful” issue—there is no contact with film. In a flood, these inks will bleed if soaked for long, and they may fade with time. Laser printed labels and metal foil box labels are preferred.

Clemons
4500 negatives, 2300 nitrate, 100% degrading
Estimated LF=12 12 LF shelved

Stored in documents boxes, interleaved inside folders. Good housing. No action required.

- Freeze the nitrate. It is exhibiting early stage deterioration (yellowing).
- The current box will take up a lot of freezer space and does not shelve efficiently in freezers—consider re-boxing only the nitrate portion into 9x11x5 boxes in preparation for freezer storage. [Require replacing (or trimming down) the letter-size folders and interleaving.]

Squire Haskins
436K negatives, 0 nitrate, 5% degrading
Estimated LF=240 180-200 LF shelved re-boxed into “shoeboxes” (49LF of 4x5s)

Stored 3 rows across utility shelving in oversize, flat, lidded off-white corrugated boxes. Boxes are extremely heavy. Original envelopes, small format filmstrips are stored in non-standard long envelopes.

- Transfer 4x5s to “shoeboxes”.
- Films stored in 3-1/4 x 14-1/4 may require custom-made, extra long, narrow boxes. Custom Manufacturing Inc, (CMi boxes) http://www.archivalboxes.com/ can fabricate these boxes at a reasonable price.
- Transfer 8x10s and Printfile pages in FRCs to 9x11x5 boxes (as with WDS Collection) or document boxes (As with Clemons Collection).

Jack White
40K negatives Slides 0 nitrate, 6% degrading
Estimated LF=12.4 13 LF shelved

Partially in good housing, remainder in FRCs

- Continue re-housing unprocessed slides in FRCs into slide pages and document boxes as used with part of collection previously re-housed.

Arlington Citizen Journal
90K negatives, 0 nitrate, 10% degrading
Estimated LF= 145 75-100 LF shelved re-boxed into XX

4x5s grouped in mailing envelopes in FRCs or in old Kodak sheet film boxes.

- Box 4x5s into “shoeboxes”. Handle as with FWST issues regarding wholesale re-housing in individual envelopes.
- Transfer directly to new boxes for now to compact collection in advance of cold storage.
APPENDIX 1

- 35mm strips can be housed in either in “pages” or paper “strip” envelopes then boxed in document boxes, 9x11x5 boxes or lengthwise in “shoeboxes”. [NB-- all films are likely acetate including 35mm that continues to be made primarily on acetate. The previous recommendation to use buffered paper enclosures for acetate and plastic for 35mm polyester negatives is not an accurate distinction between these formats.]

Zoe Davis
236 negatives, 236 nitrate, 0% degrading
Estimated LF= 1 1 LF shelved
Good housing. No action needed.

Bill Wood
70 negatives, 0 nitrate, 100% degrading
Estimated LF=0.1 1 LF shelved
Good housing. No action needed.

Bonneau/Beaulac
8K negatives, 0 nitrate, 0% degrading
Estimated LF= 2.25 3 LF shelved
Good housing. No action needed.

Dennis Arnold AR505
3K negatives, 0 nitrate, 0% degrading
Estimated LF= 2.5 3 LF shelved
Good housing. No action needed.

Jack Graves GA230, GA237
436 negatives, 0 nitrate, 0% degrading
Estimated LF= 0.1 1 LF shelved
Good housing. No action needed.

Ft. Worth News Tribune not considered at this time
190K negatives/slides 0 nitrate, 5% degrading
Estimated LF= X LF shelved reboxed into XX
Stored in FRCs?

UTA Photographs AR324
623 negatives/slides 0 nitrate, 5% degrading
Estimated LF= ? 1 LF shelved ?
Stored in various document boxes.

UTA News Service
27K negatives, 0 nitrate, 5% degrading
Estimated LF= 4 4 LF shelved reboxed into XX
No action needed. Housed in document boxes.

UTA Photographs (2009-7)
83K negatives, 0 nitrate, 5% degrading
Estimated LF= 12 LF 12 LF shelved re-boxed into standard boxes
Transfer contents of binders in 12 FRCs to either document boxes or binder-clamshell type boxes (which can be shelved flat/stacked).
SPCO copy negatives
600 negatives, 0 nitrate, 5% degrading
Estimated LF= 2  2.5 LF shelved
Good housing. No action needed.

SPCO Map slides
4K slides, 0 nitrate, 100% degrading
Estimated LF= 12  2-4 LF shelved re-boxed?
Transfer to slide pages from carousels, then box in document boxes, 9x11x5 boxes or binder-clamshell boxes.

Microfilm
Various microfilms in standard microfilm boxes stored in 4 cabinets (4th is ¼ full). UTA masters are stored UTA LCD depository, but not in cold storage (polyester masters?). These film boxes could be placed in larger cartons made for this purpose, then placed in cold storage.

CDs
CDs are not a permanent media as the electronic files can become corrupted, the CD may become unplayable, and format obsolescence is a risk. Provide additional backup copies on the UTA Library server (with auto-backups by IT) and a department hard drive.

VHS, magnetic media, and motion picture format originals
Original VHS tapes should be stored in cool storage (e.g., new A/V vault) and DVD access copied made. Basic preservation recommendations for these media call for cool, dry storage. The appropriate international standard, ISO 18923 Polyester Base Magnetic Tape- Storage recommends a maximum temperature of 65°F at a maximum 30%RH or no more than 74°F if a lower RH of 20% can be maintained. The current archives storage room is generally too humid in the summer months although the average winter temperature and relative humidity is closer to the upper limit of the standard.

There are probably local vendors for transcription onto DVD. Several vendors, located in the Washington DC metro area, perform a large amount of work for historic collections nation-wide. They have available the appropriate government specifications for preservation duplication and for generating access copies: Colorlab www.colorlab.com and Bono Film and Video www.bonofilm.com both duplicate motion picture and video; Cutting Corp. www.cuttingarchives.com duplicates audio formats.
Excerpts from Wagner Report's Appendices

**Drawing X – INSTITUTION COLD VAULT Floor Plan with Shelving Layout, OPTION 2:**

- **Option 2 Office 170SF / Vault A 340SF / Vault B 650SF**
- **Vault Mechanical Room**
- **Existing Mechanical Room**
- **Option 2 Staff Room 290SF**
- **Kitchen**
- **Office 3 Office / 3 Shelves / 3 Carts**
- **Vault A 2400SF / 34 Shelves / 41 BOXES / 210 PAR**
- **Vault B 650SF / 345 Shelves / 680 BOXES / 100 CARRIAGE**
- **Carriage 33 IN. WIDE**
Appendix 1

Drawing X - Institution Floor Plan: Shows Room B05/06 Location for Cold Vault
Scale: 1" = 20' (0.05" = 1')
Wagner's

Appendix 3
Table of Contents

Appendices
Appendix A — ISO International Storage Standards
Appendix B — Overview of Cold Storage Options
Appendix C — Film and Color Deterioration and Cold Storage Preservation
Appendix D — Working with Degraded Cellulose-based Films
Appendix E — Nitrate Storage
Appendix F — Cold Storage Handling/Packaging Guidelines
Appendix G — Retrieval Procedures from Cold Storage
APPENDIX A

Environmental Standards of the International Standards Organization

Paper - ISO TR01-1995
(Allows set point temperature and RH within allowable temperature and RH range; allows seasonal drift within range.)

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Records</td>
<td>35-65°F (2-18°C)</td>
<td>35-50%RH</td>
</tr>
<tr>
<td>Max daily fluctuation</td>
<td>±2°F (1°C)</td>
<td>±3%</td>
</tr>
<tr>
<td>Max monthly drift</td>
<td>±3°F (1.5°C)</td>
<td>3%</td>
</tr>
</tbody>
</table>

Photographic Film - ISO 18911 (formerly ISO 5466 and ANSI/PIMA IT9.11)
(Specifies a maximum temperature with a set point RH within an allowable RH range for that temperature; the temperature and RH combinations give the same approximate life expectancy and allow options in design.)

Maximum projected useful life expectancy at these conditions is a minimum of 500 years for all materials cited.

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black and White Polyester</td>
<td>21°C (70°F)</td>
<td>20-30%</td>
</tr>
<tr>
<td>Black and White Acetate</td>
<td>2°C (35°F)</td>
<td>20-30%</td>
</tr>
<tr>
<td>OR (higher temp at lower RH)</td>
<td>5°C (41°F)</td>
<td>20-40%</td>
</tr>
<tr>
<td>OR (higher temp at lower RH)</td>
<td>7°C (45°F)</td>
<td>20-30%</td>
</tr>
<tr>
<td>Color Film (acetate and polyester)</td>
<td>-10°C (14°F)</td>
<td>20-30%</td>
</tr>
<tr>
<td>OR (higher temp at lower RH)</td>
<td>-3°C (28°F)</td>
<td>20-40%</td>
</tr>
<tr>
<td>OR (higher temp at lower RH)</td>
<td>2°C (35°F)</td>
<td>20-30%</td>
</tr>
<tr>
<td>Max daily fluctuation</td>
<td>±2°C (3°F)</td>
<td>±5%</td>
</tr>
</tbody>
</table>

Photographic Prints - ISO 18920 (formerly ISO 6061 and ANSI/PIMA IT9.20)
(Specifies a maximum temperature with a set point RH within an allowable RH range for that temperature.) No LE (life expectancy) has been designated, but actual history with the materials suggests 100+ years for well-processed B-W prints.

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black and White (Silver)</td>
<td>18°C (65°F)</td>
<td>30-50%</td>
</tr>
<tr>
<td>Color-Silver Dye Bleach</td>
<td>18°C (65°F)</td>
<td>30-50%</td>
</tr>
<tr>
<td>Color Chromogenic Dye</td>
<td>2°C (35°F)</td>
<td>30-50%</td>
</tr>
<tr>
<td>Color-new technologies, very unstable color</td>
<td>-3°C (28°F)</td>
<td>30-50%</td>
</tr>
<tr>
<td>Max daily fluctuation</td>
<td>±2°C (3°F)</td>
<td>±5%</td>
</tr>
</tbody>
</table>

Photographic Plates - ISO 18918 (formerly ISO 3897 and ANSI/PIMA IT9.18)
(Specifies a maximum temperature with a set point RH within an allowable RH range for that temperature.) No LE (life expectancy) has been designated, but actual history with the materials suggests 100+ years for well-processed plates.

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black and White</td>
<td>18°C (65°F)</td>
<td>30-40%</td>
</tr>
<tr>
<td>Max daily fluctuation</td>
<td>±2°C (3°F)</td>
<td>±5%</td>
</tr>
</tbody>
</table>

Other storage standards:

Photographic Activity Test Method ISO 18916 (formerly ANSI/PIMA IT9.16)
Specifies a method used to test for the photo-reactivity to paper or plastic enclosures, inks, and adhesives to B-W and color photographs. All photographic enclosures should pass this test.

Filling Enclosures and Storage Containers ISO 18962 (formerly ANSI/PIMA IT9.2)
Specifies acceptable materials and designs for paper and plastic enclosures used to house photographs. All photographic enclosures should meet this specification.
Polyester Base Magnetic Tape- ISO 18923 (formerly ISO 15534 and ANSI/PIMA IT9.23)
(Specifies a maximum temperature with a set point RH within an allowable RH range for that temperature; the temperature and RH combinations give the same approximate life expectancy and allow options in design.)
Maximum projected useful LE (life expectancy) at these conditions is 30 years. System obsolescence of playback machinery/software may be a limiting factor for LE.
- Tape (audio, video, data, digital) 11°C (52°F) 20-50% OR (higher temp at lower RH)
- OR (higher temp at lower RH) 17°C (63°F) 20-50% Max daily fluctuation ±2°C (±5°F) ±5%

Optical Disc- ISO 18925 (formerly ANSI/PIMA IT9.25)
(Specifies a maximum temperature/relative humidity range and a preferred temperature at the same RH range. No LE (life expectancy) has been designated and is dependant on the type of material components of the CD and writable format. Some discs are estimated to last 100 years. However, system obsolescence of playback machinery and software is the limiting factor in LE for most discs. Protection may be increased by storage at lower temperature and relative humidity.
- Maximum allowable conditions 25°C (77°F) 20-50% Preferred conditions not to exceed 23°C (74°F) 20-50% or be less than -10°C (14°F) Max daily fluctuation Not Given ±5%

Mixed Media Archives—ISO 18934
Specifies climates when different media are stored within the same room

<table>
<thead>
<tr>
<th>Storage conditions:</th>
<th>Glass</th>
<th>Nitrate</th>
<th>Acetate</th>
<th>Polyester</th>
<th>Photo prints</th>
<th>Electro-photographic, dye sub, ink jet</th>
<th>Magnetic</th>
<th>CD, DVD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>plates</td>
<td>B&amp;W Colour</td>
<td></td>
<td>B&amp;W Colour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Room                | 16°C to 22°C 30% RH to 50% RH | Fair | No | No | Good | Good | Noc | Noc | Fair
| Cool                | 8°C to 16°C 30% RH to 50% RH | Good | No | No | Good | Good | No | Noc | Good
| Cold                | 0°C to 8°C 30% RH to 50% RH | Very good | Good | Good | Very good | Good | Good | Good
| Sub-zero            | -20°C to 0°C 30% RH to 50% RH | Very good | Very good | Very | Very | Very | Very | Good |

- Shall be stored at subzero temperatures if there are advanced signs of decay, such as discoloration, outgassing, rusted cans, brittle film base or image deterioration.
- Brittleness or delamination are possible with older plates.
- May result in base degradation.
- Image fade or colour balance shift may occur for chromogenic colour, thermal dye transfer and some ink jet inks. Room conditions are good for electrophotographic, pigment (carbon), dye inksub (dye transfer), silver dye bleach and dye silver diffusion transfer (instant prints).
- Degradation of magnetic layer binder is a concern.
- Lubricant separation from binder is possible.
- Image change may occur if improperly processed or stored in enclosures that emit peroxides.
- Staining, yellowing, and dye migration are potential problems.
- Delamination is possible with some optical discs.
APPENDIX B  Overview of Cold Storage Options

The National Park Service has developed an online training tutorial covering all aspects of cold storage: Cold Storage: A Long-Term Preservation Strategy for Film-Based Photographic Materials (2009, National Park Service) available at http://www.nps.gov/history/museum/coldstorage/NPSColdStorage.swf

This training module emphasizes the use of stand-alone freezer units, but also covers the topics of film identification and history, specifications for vaults, and vapor-proof packaging of containers for freezer units and vaults lacking humidity control. A specification for cold storage vaults is also included in this module:

Conserva-o-grams covering various aspects of cold storage are available at http://www.nps.gov/history/museum/publications/conserveoagrams/constoctoc.html
#14-10 Overview of Cold Storage; #14-11 Using Freezers; #14-12 Vapor-Proof Packaging. Also of interest is #14-8 Caring for nitrate film.

Vaults are generally the more cost-effective option for larger collections above 400 CF. Wagner discusses cold storage options such as freezers, vaults, and leased storage. Cold Storage Options: Costs and Implementation Issues. Available at http://mac-mellon.org/issue-in-conservation-documentation/vats.

On-Site cold storage options for 200-400 cubic feet
Stand-alone freezers vs. vaults
There are two viable cold storage options to consider for small volume collections ranging from 200-400 CF: commercial or household freezers (20CF volume) or vaults. Stand-alone freezers have capacities ranging from 20, 40 and 70CF and allow for use in those with electrical outlets and available space (even hallways). A vault requires a centralized dedicated location with adequate headspace for mechanicals and proximity to mechanical systems and their utility lines.

Multiple freezers require more floor space than a comparable vault. Inexpensive household freezers have limited shelf capacity and dimensions compared to more expensive commercial models. Vaults are more flexible in storage use and space.

The base costs for 200 cubic feet of storage ($30-50,000) are comparable for freezer units or a simple freezer vault (without humidity control) while a simple humidity-controlled vault is usually twice as expensive. In addition, it is advisable to have each freezer unit hooked up to a central station alarm if possible, or to a data-logger temperature alarm with auto dialer. Depending on the data logger, this can increase the costs substantially over a base unit. The cost of vaults will also increase as desirable features are added such as sprinklers, central station monitoring, keypad doors, air filtration, redundant systems, etc.

Above 400 cubic feet of storage, the cost difference between options starts to diminish and vaults are the more cost-effective method of cold storage.

Use of freezers or a comparable simple freezer vault without RH control will entail additional costs not required with a humidity-controlled vault: labor costs and moderate housing costs to box collections currently stored in cabinets and for the associated vapor proof packaging of all containers. Sealed cabinets can also be used in simple freezer vaults to eliminate vapor-proof packaging of individual boxes.

Climate-controlled vaults
While a climate-controlled vault is more expensive, existing shelving for the bulk of the collections can be used and no vapor proof packaging is required resulting in labor savings; see cold storage packaging and handling procedures in Appendix C. A climate-controlled vault will allow for staff browsing of more actively used collections while they are in cold storage, and item level retrieval. Air filtration is advisable to minimize the eventual buildup of slowly off-gassed volatile organics.
Building a vault
If a vault is selected as the most appropriate option, only vendors with proven track records should be contacted for quotes and designs. A separate vendor list is attached. For comparison quotes, the vendor will need to know the vault dimensions, temperature e.g., below freezing (25°F) or above (e.g., 40°F); controls for humidity (35%) if desired and type (e.g., desiccant wheel); the need for back up mechanicals (desirable if budgets allow); auto shut off for overheating and excessive humidity; and site location with plans showing architectural information (utilities and construction). A formal generic specification is available from The National Park Service publicly available at: http://www.nps.gov/historic/museum/coldstorage/pdf/621.pdf

Funding Sources:
A list of non-federal funding sources listed by state can be found in Foundation Grants for Libraries, Archives, and Museums, 2010 Edition http://www.loc.gov/preservation/foundn-grants.html

Federal funding sources include:
IMLS
NEH
NBPRC

IMPLEMENTATION
Access to collections
Cold storage will change the way staff and researchers access the collections [see ]. Although cold storage procedures are more cumbersome and time consuming than storage at room temperature, they quickly become routine. Researchers must be advised of lead times required for collections stored in the cold to allow for warm up. In practice, immediate staff access is more restricted with simple freezer storage, while climate-controlled vaults at least allow staff to have item-level access in the cold.

Boxes in simple freezer units or vaults must be sealed in vapor proof packaging for cold storage to protect from humidity changes and moisture condensation. Therefore, browsing inside sealed boxes is not possible necessitating detailed finding aids and box location maps to facilitate retrieval.

Items stored in climate-controlled vaults can be carefully browsed (cold photographs are brittle), but still require sealing in simple plastic bags if removed directly to ambient conditions to protect from moisture condensation. If an R11-controlled vault has a vestibule (staging or acclimation room) set at the specific appropriate climate, items can be taken directly to that room without protective bagging and examined. Items can then warm up to that temperature (or overnight) and be taken directly to ambient conditions without bagging.

To protect from moisture condensation during the warm up phase, all items pulled directly from any type of cold storage must warm up to room temperature before they can be removed from their respective types of moisture proof packaging (vapor proof package or plastic bag). Warm up periods range from 1/2 hour for a few sheets of film, to 4 or 6 hours for boxes depending on size.

Many institutions institute a researcher policy of appointments with retrieval of items the afternoon before the appointment day, or pull times no later than 10am for same day use by 3pm. Assuming normal office type environmental conditions or better, special humidity conditioning is not required prior to re-filing. However, boxes in simple freezer storage must be resealed in their vapor proof packaging while boxes and single items in climate-controlled vaults can be re-filed as usual (condensation does not form when items are re-filed in the cold).

Minimizing “time out of cold storage”
Time spent at room temperature offsets the time spent at cold temperatures diminishing its benefits. If only a few items are needed from a box for extended periods, the box should be placed back in cold storage after the requested items are pulled so that the entire contents do not lose the benefits of cold storage. Ideally, digital masters should be made for high use materials as the items are requested, thus generating a copy available for the next request. Topics of high interest or research value can be duplicated in advance as budgets allow.
APPENDIX C
Film and Color Deterioration and Cold Storage Preservation

Acetate film deteriorates within decades of manufacture. Storage at room temperature or higher, and at elevated relative humidity accelerates the normal deterioration process. The film becomes acidic and releases a vinegar odor as the degradation process gains momentum and may warp. After the point of high acidity is reached, the film base becomes brittle, shrinks and forms grooves (channels) that mar the image quality. Eventually the film delaminates into its component layers and the image quality is extremely poor. At that point the only way to save the image is to strip the emulsion layer from the plastic base, an expensive process, or to attempt digital restoration (also expensive). Nitrate stains yellow/amber, silver outs, cracks, becomes tacky and then powders into fragments.

Collections pre-dating 1980 can be considered to be increasingly acidic even if a strong odor or deformations are not yet evident. Collections pre-dating 1960 are at very high risk, increasing dramatically with each decade of age. The amount of acidity can be monitored using A-D Strips (acid-detecting strips) available from the Image Permanence Institute (www.imagepermanenceinstitute.org). High acidity correlates to an advanced state of deterioration that precedes actual physical deformation of the negative. At the highest level of acid, the degradation will occur at a rapid rate. Acidic older films in apparently good physical condition are notorious for spontaneously undergoing rapid deterioration when they are removed from their normal storage to the open air for printing, viewing or re-housing.

The color dyes in color photographs fade with time due to light exposure and ambient temperatures. This fading is accelerated by acidic conditions generated by the decomposing film base or highly acidic enclosures and adhesives. Ektachrome films are more prone to fading in storage than Kodachrome.

Cold Storage for Long-term Preservation and Time-out-of-storage

Cold storage effectively “halts” the deterioration process for film and color dyes. However, constant removal from cold storage negates the benefits of time spent at the lower temperature. The table below illustrates the dramatic impact of cold storage. This effect can be seen from data compiled by the Image Permanence Institute that provides a generic life expectancy in years called the Preservation Index. Because acetate film and dyes are both organic materials, their degradation rates are somewhat similar and are generalized for convenience of comparison.

| Table 1 | # YEARS for color dyes to fade 30% when removed from storage to room temperature 24°C (75°F) / 60% RH in dark conditions (storage) |
| --- | --- | --- | --- | --- | --- | --- |
| Storage Conditions | Time out of cold/year | 10 days out of cold/year = 3 mos/9 years | 1 mos. out of cold/year = 2 mos/3 years | 3 mos. out of cold/year = 12 mos/4 years | 4 mos. out of cold/year = 12 mos/3 years |
| **Temperature °C (°F)** | **% Relative Humidity** | 0 time out of cold/year (Preservation Index or PI in years) | 3 mos/9 years | 6 mos/6 years | 9 mos/9 years | 12 mos/12 years |
| 21°C (70°F) | 40% | 60 (95–51 years) | 60 | 50 | 40 | 35 |
| 16°C (60°F) | 40% | 125 (PI=100 years) | 115 | 90 | 50 | 45 |
| 10°C (50°F) | 40% | 300 (PI=211 years) | 250 | 125 | 60 | 50 |
| 4°C (40°F) | 40% | 700 (PI=430 years) | 350 | 175 | 70 | 50 |
| 0°C (32°F) | 40% | 1500 (PI=850 years) | 560 | 200 | 70 | 50 |
| −2°C (28°F) | 40% | >3500 (PI=10,000 years) | 700 | 250 | 10 | 0 |

This chart is for illustrative purposes only, the actual fading rates or life expectancy for a specific material will be different. Color fading rates are somewhat similar to degradation rates of other organic materials such as cellulose-based plastic film. For general comparison, these rates are used to illustrate the effect of time-out-of-storage at ambient conditions on the longevity of materials overall. 1Estimated time to fade 30% at 25°C (77°F) 40% = 40 years. Information from the Image Permanence Institute, Storage Guide for Color Photographic Materials, 1998.

Minimizing “Time-out of Cold Storage”
If only a few items are needed from a box for extended periods, the box should be placed back in cold storage after the requested items are pulled so that the entire contents do not lose the benefits of cold storage. Ideally, digital masters should be made for high use materials as the items are requested, thus generating a copy available for the next request. Topics of high interest or research value can be duplicated in advance as budgets allow.
APPENDIX D
WORKING WITH DEGRADING CELLULOSE-BASED FILMS


GENERAL HEALTH AND SAFETY GUIDELINES

Use common sense!

Always work in a well-ventilated space. Options, from preferred to minimal, include:

- Laboratory fume hood or air extraction trunks
- Room air filter with activated charcoal
- Fans blowing away from the boxes

Wear an activated charcoal respirator or an activated charcoal acid gas filter mask

- Masks should be worn where fume hoods or extraction trunks are not available

NEVER wear contact lenses:

- Acid gasses will be absorbed by them and can cause eye irritation or possibly

Wear thin plastic gloves instead of cotton or nylon

- Skin can absorb acids and other chemicals
- Cloth provides little protection against chemicals, especially if damp with perspiration

Take frequent breaks or limit hours

- If skin, eye, nasal or throat passage become irritated stop immediately
- Re-evaluate conditions if irritation occurs or sensitivity occurs (skin irritation, allergy-like symptoms)
- People with existing chemical sensitivities or asthma may be prone to irritation
- People with no previous sensitivities could develop some to chemicals from films if standard laboratory handling precautions listed above are not provided

ISOLATING COLLECTIONS WITH STRONG FILM DEGRADATION ODOR

Odorous boxes adversely affecting air quality in storage areas

- Isolate individual boxes by sealing inside individual re-closable vapor-proof bags such as Static Shield available from www.Uline.com in sizes up to 24x30.

Odorous cabinets adversely affecting air quality in storage areas

Ventilation and air filtration with activated charcoal room filters are the better options since cabinets are more difficult to isolate than boxes, but the following might help to minimize odor seepage from drawer gaps.

- Place sheets of Microchamber charcoal paper or board inside each drawer on top of the contents. If there is adequate headspace, or line the sides of the drawer.
- Tape sheets of vapor barrier e.g., Static Shield Type 111™ or Marvelseal 360, to the top front edge of the cabinet and allow it to drape over the cabinet to cover gaps between the drawers. Microchamber paper can be taped to the underside of the Static Shield as an odor absorber.
APPENDIX E
NITRATE STORAGE
An excellent description of nitrate care is available from the National Park Service Conserve-o-grain #14-8 caring for NitrateFilm available at http://www.nps.gov/history/museum/publications/conserveograin/con_teac.html

Nitrate film cold storage needs
Most jurisdictions follow the requirements for nitrate storage specified by the National Fire Protection Association in NFPA 40 Storage and Handling of Nitrate Film. According to NFPA 40, 50 lbs or less of nitrate film do not require additional precautions such as special cabinetry or vaults. However, it is best to determine if local jurisdictions or insurance policies have more stringent requirements for sprinklers, fire wall ratings, etc. [see Table 1B for nitrate weight conversion]

Nitrate films should be inspected and any unusable deteriorated film that is powdered, tacky or fused to envelopes or other films should be disposed of as a hazardous waste. Usable but deteriorated film that is amber colored or extremely silvered and brittle should be scanned or duplicated. Disposal should be considered in this case, but cold storage is required for permanent retention. The remaining films should be boxed and housed in vapor proof packaging then stored in a freezer or cold vault. If desired, a small 3 cubic foot freezer could be dedicated to nitrate storage.

Nitrate Weight Equivalency Estimates NFPA-40 Specification for Storage of Nitrate Film

<table>
<thead>
<tr>
<th>Format</th>
<th>5 lbs. (use limit per workstation and shipping maximum)</th>
<th>&lt;50 lbs. (storage limit for an unvented cabinet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35mm motion picture</td>
<td>1000 ft (1 reel)</td>
<td>10,000 ft (10 reels)</td>
</tr>
<tr>
<td>8 x 10</td>
<td>135</td>
<td>1350</td>
</tr>
<tr>
<td>5 x 7</td>
<td>320</td>
<td>3200</td>
</tr>
<tr>
<td>4 x 5</td>
<td>700</td>
<td>7000</td>
</tr>
<tr>
<td>35mm still picture</td>
<td>2855</td>
<td>28550</td>
</tr>
<tr>
<td>(3 frame strips)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x 1</td>
<td>2000</td>
<td>20000</td>
</tr>
<tr>
<td>2 1/4 x 3 1/2</td>
<td>6000</td>
<td>60000</td>
</tr>
</tbody>
</table>

0- 25 lbs Extended Storage Cabinet -- No explicit description of storage for less than 25 lbs in NFPA 40
25- 51 lbs Extended Storage Cabinet required (Flammable Material Storage freezerequalizes)
51- 375 lbs Extended Storage Cabinet with automatic sprinkler & vent
> 375 lbs Extended Storage Vault

NFPA 40, 6.3.3.2*Vaults shall have temperature controlled to maintain temperature at 70°F (21°C) or less. The standard does not comment significantly on weight limits in regard to an institution storing film in separate groups in separate spaces or buildings. The standard does indicate that the upper limit of a film cabinet is 375 lbs (75 rolls), while quantities over 750 lbs (150 rolls) are to be stored in vaults. No upper limit is stated in the section on extended term cabinets, in this summary the figure from the section on film cabinets has been cited. Vaults require deluge sprinklers, blow out wall panels and floor ventilation drains/vents for heavier-than-air gasses evolved from the film.

Disposal
When nitrate materials are identified for de-accession, the original nitrate film becomes a “hazardous waste,” strictly regulated by the Environmental Protection Agency under the Resource Conservation and Recovery Act, and it shall be destroyed according to hazardous waste disposal procedures established by the institution’s Safety Office (and federal, state, and local regulations regarding the disposal of hazardous waste).

Transportation within units, to storage, or to reformatting vendors
All transportation of nitrate film is regulated by DOT CFR 49. Shipments are limited to 5 lbs/box, special boxes, hazmat-flammable signage. Certification as a nitrate shipper is required and online courses are available.
## APPENDIX 1

### Nitrate Sheet Film Weights by format and corresponding quantities for DOT shipping regulations and NFPA storage codes

<table>
<thead>
<tr>
<th>Neg Format</th>
<th>Bare Wt of one Neg</th>
<th># Negs/Max 5lb shipping/plus1 (2.25kg)2</th>
<th># Negs/50lb Storage Cabinet Wt. Limit (22.5kg)3</th>
<th># Negs/“Standard Format Box”</th>
<th>Film Wt./“Standard Format Box”</th>
<th># of “Standard Format Boxes/50 lbs Cabinet Wt. Limit”</th>
<th>Approx. # Boxes (lbs)/Cub. Ft (NARA CF)4</th>
<th>Est. # CF/50lbs Cabinet Limit (NARA CF)4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8x10</td>
<td>0.6oz (18g)</td>
<td>135</td>
<td>1,350</td>
<td>100</td>
<td>3.75 lb (1.69kg)</td>
<td>15</td>
<td>600 (~23 lbs)</td>
<td>2.2 CF (1,330)</td>
</tr>
<tr>
<td>5x7</td>
<td>0.25oz (7.25g)</td>
<td>320</td>
<td>3,200</td>
<td>85</td>
<td>1.32 lb (0.59kg)</td>
<td>30</td>
<td>1,000 (~28 lbs)</td>
<td>1.8 CF (3,240)</td>
</tr>
<tr>
<td>4x5</td>
<td>0.12oz (3.2g)</td>
<td>700</td>
<td>7,000</td>
<td>200</td>
<td>1.40 lb (0.63kg)</td>
<td>30</td>
<td>2,000 (~21 lbs)</td>
<td>2.4 CF (6,720)</td>
</tr>
<tr>
<td>2x3</td>
<td>0.04oz (1.1g)</td>
<td>2,000</td>
<td>20,000</td>
<td>200</td>
<td>0.5lb (0.23kg)</td>
<td>100</td>
<td>5,000 (~13 lbs)</td>
<td>3.9 CF (19,900)</td>
</tr>
<tr>
<td>2.25 x 3.5</td>
<td>0.013oz (0.38g)</td>
<td>6,000</td>
<td>60,000</td>
<td>200</td>
<td>0.17lb or 2.7 oz (0.06kg or 75 g)</td>
<td>120</td>
<td>4,000 slide images (800 5-frame strips) (~1.5lbs)</td>
<td>33 CF (1,330,000 images or 26:400 5-frame strips)</td>
</tr>
<tr>
<td>35mm 5-frame strips</td>
<td>0.03oz (0.8g)</td>
<td>2,855 (strips) or 14275 images (5-frame strips)</td>
<td>28,550 (strips) or 142,750 images (5-frame strips)</td>
<td>150 (strips) or 750 images (5-frame strips)</td>
<td>0.26lb or 4.2 oz (0.12kg or 117.6g)</td>
<td>150</td>
<td>4,000 slide images (800 5-frame strips) (~1.5lbs)</td>
<td>33 CF (1,330,000 images or 26:400 5-frame strips)</td>
</tr>
</tbody>
</table>

1 Commercial DOT limits on shipping hazardous materials, including nitrate, is 5 lb film/box/shipment. Actual weight of a box may be more than 5 lbs due to weight of enclosures and container.

2 NFPA-40-2000 Storage of Nitrate Film weight requirements for cabinets and vault storage:
1) >500 lbs storage need sprinkled room and cabinet with explosion vents;
2) >75 lbs storage need cabinet w/interior sprinkler and explosion vents;
3) >75 lbs storage, need a specially constructed sprinkled vault with explosion venting, blow out walls and fire walls with 3-4 hours ratings.

3 Standard format boxes may vary as will # items/box: in this case shoebox style boxes that are 12 inches long are used for the 4x5 and smaller formats excluding 35mm strips, narrow boxes that are 2-3 inch wide at the base are used for 5x7 films, and boxes with 5 inch wide bases are used for 8x10 films (based on boxes used at one institution (Library of Congress) in 1990).

4 NARA (US National Archives) Stills conversions used for number of film negatives/cubic footage are:
4x5 film negs: 2,000/CF; 5x7 film negs: 1,000/CF; 8x10 film negs: 600/CF; 35mm 120mm negs: 5,000/CF; 35mm slides: 4,000/CF.

Quantities of film/box vary with enclosure thickness, degree of compartmentation etc. Actual quantities/CF may vary. For example, 250 4x5 negatives in individual sealed paper envelopes can fit easily in a 12 in. L shoebox; 4 boxes/CF=1000 4x5 negatives/CF. Weights are based on measurements of single sheets of films in formats listed taken by author at Library of Congress in 1990.
APPENDIX F

COLD STORAGE PACKAGING

An excellent description of vapor-proof packaging is available from the National Park Service Conserve-a-gram 14-11 Using Freezers: #14-12 Vapor-Proof Packaging available at

http://www.nps.gov/history/museums/publications/conserving/grams/cons_tec.html

Vapor-proof packaging involves placing a container inside two separately sealed vapor barrier bags. The inner bag is a metalized foil plastic bag while the outer bag is a clear polyethylene bag that offers a second barrier at low temperatures and protects the inner bag from abrasion and punctures. The inner vapor-proof pouch bag is made from either opaque Marvelseal metal-foil-plastic or semi-translucent Static Shield metalized plastic. Marvelseal offers superior vapor barrier properties, but is opaque; requiring labeling the exterior of the bag. Static Shield is also a very good barrier, but being transparent allows the existing box label to be visible after wrapping.

The basic procedure requires placing an optional humidity indicator card inside the box before sealing—useful if there is a concern that the bags have leaked to determine if the contents were affected. The box is inserted into the inner vapor-proof pouch bag. The pouch bag is sealed with tape after squeezing out excess air. A humidity indicator card is taped to the outside of the bag in a visible location, usually near the box label. The box is inserted into a heavyweight, 6-mil polyethylene bag as the second barrier layer and sealed with tape after squeezing out excess air. Excess air must be eliminated to avoid “pillowing” that will stress seams and tape seals and make stacking difficult.

First, assemble all supplies and tools:

Barrier bags (inner bag)

- Static Shield Type 111™ flute cut open end (maximum dimension 24x30) Uline www.uline.com
- Marvelseal 360 film available on rolls from www.universityproducts.com

- Custom flute-cut end bag fabricator in small quantities, - $3.00/bag:
  - Edeo Supply Corp www.edecupply.com Tel. 800-221-0918
  - Contact Brian Griffin, info@edecupply.com or brian@edecupply.com

Polyethylene bags (outer bag)

- Plain, clear, “press to close” (zipper-lock), 6 mil (thickness) McMaster-Carr www.mcmaster.com

Almost all other supplies can be purchased from suppliers of conservation and archival-quality materials:

- Cobalt salt humidity indicator cards—Commercial Indicator Cards 15%-95% Cat. # 6203-100, Sphinnx Adsorbents www.sphinxxadsorbents.com
- Archival double-sided tape (3M™ #415)
- Packaging tape (3M™ #313 or other tape with adhesion rated below freezing)
- “Filler” material: Ethfoam™ sheets, crumpled archival paper, mat board or corrugated plastic etc.
- Scissors, pencils, paper, foil-backed labels, bone folders, linen twill tape, weights

Calculate largest bag dimension required for the storage boxes:

To wrap the boxes/cans using the recommended vapor-proof packaging design, you must have the right sized bags. Not all sizes are available in the static shielding and polyethylene bags, so you may have to select the closest (larger) size available to ensure you can enclose your box/can and have enough excess to fold and tape/ seals the bags properly.

FORMULA: (L + H + 1) x (W + H + 1) = Recommended Bag Dimensions (LxW)

For example, if the dimensions of your box are 45x5Wx12L(D), then your bag Length =12+4+1=15 and your bag Width =5+4+1=10. You will need a bag at least 15x10W.

To make sure that the box is not too tight, you may want to add 1-1/2-2 inches to the formula instead of 1 in.

- Box H + W + 1-1/2 (or 2) inches = bag width across short sides
- Box L + H + 1-1/2 (or 2) inches = bag length across longest side
APPENDIX F
COLD STORAGE PACKAGING

An excellent description of vapor-proof packaging is available from the National Park Service Conserve-o-gram #14-11 Using Freezers: #14-12 Vapor-Proof Packaging available at http://www.nps.gov/history/museum/publications/conserveogram/con_ser.html

Vapor-proof packaging involves placing a container inside two separately sealed vapor barrier bags. The inner bag is a metalized foil plastic bag while the outer bag is a clear polyethylene bag that offers a second barrier at low temperatures and protects the inner bag from abrasion and punctures. The inner vapor-proof pouch/bag is made from either opaque Marvelseal metal-foil-plastic or semi-translucent Static Shield metalized plastic. Marvelseal offers superior vapor barrier properties, but is opaque and requires labeling the exterior of the bag. Static Shield is also a very good barrier, but being translucent allows the existing box label to be visible after wrapping.

The basic procedure requires placing an optional humidity indicator card inside the box before sealing—useful if there is later a concern that the bags have leaked to determine if the contents were affected. The box is inserted into the inner vapor-proof pouch/bag. The bag is sealed with tape after squeezing out excess air. A humidity indicator card is taped to the outside of the bag in a visible location, usually near the box label. The box is inserted into a heavy-weight, 6 mil polyethylene bag as the second barrier layer and sealed with tape after squeezing out excess air. Excess air must be eliminated to avoid “pillowing” that will stress seams and tape seals and make stacking difficult.

First, assemble all supplies and tools:

Barrier bags (inner bag)
- Static Shield Type 111™ flush cut open end (maximum dimension 24x30) Uline www.uline.com
- Marvelseal 360 film available on rolls from www.universityproducts.com
- Custom flush-cut end bag fabricator in small quantities, ~$3.00/bag:
  - Edco Supply Corp www.edcosupply.com Tel. 800-221-0918
  - Contact Brian Griffin, info@edcosupply.com or brian@edcosupply.com.

Polyethylene bags (outer bags)
- Plain, clear, “press to close” (zipper-lock), 6 mil (thickness) McMaster-Carr www.mcmaster.com

Almost all other supplies can be purchased from suppliers of conservation and archival-quality materials:
- Cobalt salt humidity indicator cards-- Commercial Indicator Cards 15%-95% Cat. # 6203-100, Sphinnx Adsorbents www.sphinnxadsorbents.com
- Archival double-sided tape (3M™ #415)
- Packaging tape (3M™ #313 or other tape with adhesion rated below freezing)
- “Filler” material: Eutecto™ sheets, crumpled archival paper, mat board or corrugated plastic etc.
- Scissors, pencils, paper, foil-backed labels, bone folders, linen twill tape, weights

Calculate largest bag dimension required for the storage boxes:

To wrap the boxes/cans using the recommended vapor-proof packaging design, you must have the right sized bags. Not all sizes are available in the static shielding and polyethylene bags, so you may have to select the closest (larger) size available to ensure you can enclose your box/can and have enough excess to fold and tape/seal the bags properly.

FORMULA: (L + H + 1) x (W + H + 1) = Recommended Bag Dimensions (LxW)

For example, if the dimensions of your box are 45x5Wx12L(D), then your bag Length =12+4+1=15 and your bag Width =5+4+1=10. You will need a bag at least 15x10W.

To make sure that the box is not too tight, you may want to add 1-1/2-2 inches to the formula instead of 1 in.
- Box H + W + 1-1/2 (or 2) inches = bag width across short sides
- Box L + H + 1-1/2 (or 2) inches = bag length across longest side
Packaging location
Select a space for packaging with an RH that does not exceed 50%. If you cannot find a space with an RH less than
50% the RH in the room can be brought down with a room dehumidifier. Scheduling large packaging projects for
winter makes this easy.

If your collection is not normally stored at or below 50% let your collection equilibrate to these drier conditions
prior to packaging if possible. Use a dehumidifier set to 40-50% in a closed room to be used for packaging and let
open boxes equilibrate for several days at the lower RH.

Fill out empty space inside boxes:
Once boxes or containers are inventoried, and labeled, fill any empty air space in boxes with “filler” material to
prevent shifting of the contents or slumping if the box is placed on its side in storage to maximize freezer space (see
Figs. 2).

Use of cobalt RH indicator cards
If possible, place a cobalt salt humidity indicator card on the box next to the label, preferably in a location that will
be visible when the bag is opened. Use two strips of archival double-sided tape or the reverse to adhere the card to
the inner bag. Avoid placing the tape directly behind the indicator spots. [This type of indicator card is temperature
sensitive and will read higher than the actual RH when placed in very cold conditions. For example, cards will tend
to read 5-10% higher at 35°F and 15-20% higher when the temperature is 10-20°F.] In order to monitor your bags
for leaks (if RH becomes high) you must first note what the RH in the room was when the boxes were packed. You
then must observe the change in RH when you first put packages in the freezer. This will be your baseline to observe
cchange over time. Packages should be checked every three months for change. However, as long as the frozen
temperature-corrected RH reads less than 60% (especially in the inner bag) there is little to worry.

Vapor barrier packaging
Insert the box or container into the inner barrier bag with the front (labeled end) of the box towards the back of the
bag. If using Static Shield bags the label should be readable through the bag when the freezer door is opened.

Squeeze out the excess air in the bag by pressing with hands along the box sides and top. Small weights or strips of
Flexi-glass placed on top of the box can assist with this process and help to secure the bag for wrapping. “Gift wrap”
the box by neatly folding up any excess bag materials at sides by forming creased flaps. Secure the flaps to the sides
with packaging tape (see Fig 4). After applying the tape use a bone folder to burnish down the tape (see Fig 5).

Fig. 2 – Filler material was placed along the left side edge and
on the top to completely fill all extra space. An RH indicator
card has been placed next to the box label.

Fig. 4 – The inner bag is in the process of being “gift wrapped”.
Excess material and flaps are being tightly secured with tape
along the right side. If using Static Shield bags the label is
clearly visible.
Align the edges of the open end of the bag and fold the excess at least once in 1-inch increments. Lay the folded section along the end of the box, and tape it down across the length, sealing it against the box. Leave a tab at the end of the tape by folding over its end to aid in removal during pulling and reuse when re-filing.

If possible, place a second RH indicator card on the outside of the vapor-proof bag, preferably near the first humidity card so they can be monitored by observing only one side.

Insert the front end of the vapor-sealed box into the heavyweight polyethylene bag so that the RH indicator cards are clearly visible once the outer bag is sealed. Repeat the above gift-wrapping procedure for the polyethylene bag. Close the zipper closure and tape it flat against the box taping over the entire end to keep it intact and provide an additional seal (see Fig. 6 & 7).
REFRIGERATOR/FREEZER STORAGE HANDLING GUIDELINES
Warm-up time to room temperature may take 2-6 hours depending on the size of the box and quantity of inside.

- Pull materials the night before for next day appointments.
- Advise researchers of wait times.
- Items requested in the afternoon may not be ready before closing time or the next day.

WHEN PULLING/REFILING BOXES, KEEP THE DOOR OPEN AS LITTLE AS POSSIBLE
- If the inside warms up too much, moisture will form on the interior, and the temperature alarm may trigger.
- Keep the refrigerator/freezer door locked to prevent casual or unauthorized access.
- Boxes are sealed inside vapor proof packaging to protect from moisture inside the unit or as the door is opened.
- These bags also protect from moisture during the warm-up phase prior to use.
- If the humidity indicator card shows a relative humidity greater than 70-80%, there may be leaks in the bag that have allowed moisture to migrate inside--boxes must be allowed to dry out and the old bags replaced.

PULLING ITEMS FROM THE UNIT
Prior to opening the door, determine the location of the item/box using the database or locator map.
1. Unlock the door.
2. Retrieve box from refrigerator/freezer--do not remove plastic.
3. Place box in the designated holding area to allow it to warm up to room temperature.
   - Place the box on top of a terry towel. The towel will absorb water that condenses on the cold box.
   - Do not remove plastic bags until box is no longer cooler than its surroundings.
4. When the box no longer feels cool to the touch and is at room temperature, wipe off any excess moisture on the outside of the plastic and open the plastic bags to remove the box or item.

USING THE INSULATED COOLER METHOD
The insulated cooler method will require a slower (overnight) warm up than bagging. Use this method if items are to be taken offsite.
1. Place the individual photographs or the entire box with its vapor-proof wrapping intact inside the cooler and close up the lid.
2. Allow the cooler to warm up slowly, usually 24 hours or overnight. Take out items for use and remove vapor-proof packaging.

RE-FILING
Do not seal boxes if they have acclimated to high humidity conditions higher than 50%--allow the materials to dry down to at least 50% or lower before vapor-proof wrapping.
1. Place box inside the metallic plastic bag (if box is not full, fill extra space with archival cardboard).
2. Squeeze out the air from the bag and seal it tightly with tape (tape over re-closable seals). Tapes an indicator card to the sealed box in a visible location. Place the box inside a heavyweight clear polyethylene re-closable bag. Squeeze out the air from the bag and seal it tightly with tape (tape over re-closable seals).
3. Place the bagged box in the unit.
4. Lock the refrigerator door and return key to ________.

EMERGENCY PROCEDURES IF TEMPERATURE ALARM SOUNDS, THE UNIT MALFUNCTIONS, OR IF HUMIDITY INDICATORS SHOW HUMIDITY ABOVE 80%
1. Unlock the door. Turn off the unit IF it is malfunctioning.
2. If the unit is malfunctioning/alarm sounding, retrieve all boxes--do not remove plastic at this time.
   - If the emergency is due to high humidity indicator card readings, only those boxes indicating humidity above 80% need to be removed from the unit--do not remove plastic at this time. Allow box to warm before removing its wrapping. If box contents are humid, dry box down to 50% before re-wrapping for cold storage.
3. Contact ________ during regular hours so that the records can be evaluated for housing or treatment needs. In the unlikely event that the boxes appear to be badly damaged and the records need immediate attention during off-hours emergencies, contact ________.

Other problems during regular hours: Contact: Off-Hours: Contact:
HUMIDITY-CONTROLLED COLD VAULT COLD STORAGE HANDLING GUIDELINES

Warm up time to room temperature may take 30-60 minutes for single photographs or two to six hours for boxes depending on the size of the box and quantity of photographs inside. PLAN ACCORDINGLY.

- FULL MATERIALS THE NIGHT BEFORE FOR NEXT DAY APPOINTMENTS.
- ADVISE RESEARCHERS OF WAIT TIMES.
- ITEMS REQUESTED IN THE AFTERNOON MAY NOT BE READY BEFORE CLOSING TIME OR THE NEXT DAY.

MATERIALS REQUIRED FOR PULLING-RE-FILING

- Standard retrieval supplies, such as gloves and carts, etc.
- Water resistant bags to place photographs inside for retrieval, such as heavyweight, clear plastic polyethylene or polypropylene bags (self-sealing Ziploc® type or bags that can be sealed with tape).
- Insulated picnic cooler if using this method (required for taking items outside the building)

FULLING PHOTOGRAPHS FROM INSIDE THE COLD VAULTS DIRECTLY TO OFFICE CONDITIONS

1. Locate photographs or box in cold vault
   - HANDLE GENTLY—COLD PHOTOGRAPHS ARE MORE BRITTLE THAN ITEMS AT ROOM TEMPERATURE AND ARE EASILY DAMAGED BY FLEXING

USING THE BAGGING METHOD

2. Place the individual photographs or the entire box inside the plastic bag
   - Small quantities of loose photos (5-10/bag) will warm up faster than large groups or an entire box.
   - Single boxes will warm up faster than several packed tightly in a single bag.

3. Squeeze out the excess air from the plastic bag and seal the bag (twist tie, or re-sealable seal, or tape).
   - Do not use the bag if the Ziploc® seal does not work or the bag has tears or other holes.

AFTER REMOVAL FROM THE VAULT TO WARMING AREA:

4. Place bagged photographs or box in the designated holding area.
   - If feasible, spread out bagged items on top of a terry towel to allow better air circulation.
   - If an entire metal cart is required, the cart may cool down while in the vault and form moisture condensation on surface when taken to ambient conditions—roll the cart onto an absorbent floor mat and periodically wipe down the cart with a terry towel.

   - DO NOT REMOVE ITEMS FROM THEIR SEALED BAGS UNTIL THEY NO LONGER FEEL COOL
   - DO NOT ATTEMPT TO SPEED UP THE WARMING OF BAGGED ITEMS BY PLACING NEAR HEAT
   - ALLOW BAGGED ITEMS TO WARM UP SLOWLY IN A COOL DRY AREA

5. When bagged photographs or boxes no longer feel cool to the touch and are at room temperature, wipe off any excess moisture condensed on the bag and open bag to remove items.

USING THE INSULATED COOLER METHOD

THE INSULATED COOLER METHOD WILL REQUIRE A SLOWER (OVERNIGHT) WARM UP THAN BAGGING. THIS METHOD MUST BE USED IF ITEMS ARE BEING TAKEN ONSITE

1. Place the individual photographs or the entire box inside the cooler and close up the lid.
2. Allow the cooler to warm up slowly, usually 12-24 hours or overnight. Take out items for use.

RE-FILING TO COLD VAULTS WHEN ITEMS HAVE BEEN AT OFFICE CONDITIONS

1. Re-file photographs or boxes directly to cold vault
   - Handle other photographs carefully during re-filing to avoid flexing cold items.
   - If the items were in higher humidity conditions, allow them to acclimate to office conditions for a day or two before re-filing.

IF VAULT MALFUNCTION—SEE SEPARATE EMERGENCY PROCEDURES

Other problems during regular hours contact: Off-Hour contact:
HUMIDITY CONTROLLED COLD VAULTS COLD STORAGE HANDLING GUIDELINES USING A CLIMATE-CONTROLLED STAGING ROOM (VESTIBULE) FOR ACCLIMATION

Warm up time in the 2-step method using a staging room takes longer since each warm up phase takes the same amount of time e.g., 30-60 minutes or 2-6 hours in the acclimation room and again at office conditions. Items usually can be removed directly to office conditions “as is” from the acclimation room without bagging BUT ONLY IF the RH is less than 45-50%, otherwise the items must be bagged to avoid condensation. PLAN ACCORDINGLY:

- FULL MATERIALS THE NIGHT BEFORE FOR NEXT DAY APPOINTMENTS.
- ADVISE RESEARCHERS OF WAIT TIMES.
- ITEMS REQUESTED IN THE AFTERNOON MAY NOT BE READY BEFORE CLOSING TIME OR THE NEXT DAY.

MATERIALS REQUIRED FOR PULLING/RE-FILING
1. Standard retrieval supplies, such as gloves and carts, etc.
2. Water resistant bags to place photographs inside for retrieval, such as heavyweight, clear plastic polyethylene or polypropylene bags (self-sealing Ziploc® type or bags that can be sealed with tape).

PULLING PHOTOGRAPHS FROM INSIDE THE COLD VAULTS TO STAGING VESTIBULE
1. Locate photographs or box in cold vault.
   - HANDLE GENTLY—COLD PHOTOGRAPHS ARE MORE BRITTLE THAN ITEMS AT ROOM TEMPERATURE AND ARE EASILY DAMAGED BY FLEXING.

2. Remove the items to the staging room intermediate climate
   - The climate of the staging room/vestibule is set at a specific intermediate climate between the cold room and office so as to avoid condensation.
   - Small quantities of loose photos (5-10 bag) will warm up faster than large groups or an entire box.
   - Single boxes will warm up faster than several packed tightly.

3. When the items feel about the same temperature as the staging room, they usually can be removed directly to the designated holding area without bagging. If the office conditions are warmer or more humid than normal, as a precaution place the items in bags just to make sure condensation does not occur. If no condensation occurs at ambient conditions, the bag can be removed.

AFTER REMOVAL FROM THE STAGING ROOM TO DESIGNATED WARMING AREA/OFFICE:
4. Place photographs or box in the designated holding area.
   - Items can be examined carefully at this point, but let them warm up at least for 60 minutes before handling.
   - If feasible, spread out items to allow better air circulation while warming to office conditions.

   - DO NOT ATTEMPT TO SPEED UP THE WARMING OF ITEMS BY PLACING NEAR HEAT.
   - ALLOW BAGGED ITEMS TO WARM UP SLOWLY IN A COOL DRY AREA.

5. When photographs or boxes no longer feel cool to the touch and are at room temperature, they can be served to researchers or scanned.

RE-FILING TO COLD VAULTS WHEN ITEMS HAVE BEEN AT OFFICE CONDITIONS
1. Re-file photographs or boxes directly to cold vault.
   - Handle other photographs carefully during re-filing to avoid flexing cold items.
   - If the items were in higher humidity conditions, allow them to acclimate to office conditions for a day or two before re-filing.

IF VAULT MALFUNCTION—SEE SEPARATE EMERGENCY PROCEDURES

Other problems during regular hours contact: Off-Hours contact:
VAULT EMERGENCY PROCEDURES

Power failure:
Leave vault closed. It should come to ambient conditions if the power failure is long enough.

Elevated temperature or RH:
Auto shutdown of a malfunctioning vault should occur after a specific increase in temperature and RH. If the unit malfunctions and the temperature exceeds 78°F or the RH exceeds 60%, and either are still increasing, determine if the cause is a simple fix that can be made quickly. If not, manually shut down and open doors and use fans until the climate has equilibrated with standard office ambient conditions (70/50%).

Low temperature and RH:
This usually is not harmful to the collections inside, but does indicate a malfunction. Determine cause and repair unit. Only if required, turn off unit and keep doors closed.
Preservation Site Survey Report

for

THE UNIVERSITY OF TEXAS AT ARLINGTON
PHOTOGRAPHIC SPECIAL COLLECTIONS

Submitted by:

Rebecca Elder
Adjunct Preservation Field Services Officer
Amigos Library Services, Inc.

Final Report
December 9, 2005
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- Appendix C: Preservation/Conservation Suppliers and Services
- Appendix D: Emergency Salvage of Moldy Books and Paper
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Appendix F: Preservation: A Selected Bibliography
Appendix G: Amigos’ Disaster Plan Template
Appendix H: NEH 2005 Preservation Assistance Grant Application
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Appendix J: Choosing and Working with a Conservator
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(www.loc.gov/preserv/care/photolea.html)

Appendix P: Storage of Photographic Materials in a Conventional Freezer
I. Executive Summary

The following report contains information and recommendations concerning preservation management and other preservation-related topics based on a site survey visit to examine the photographic collections at the University of Texas at Arlington (UTA) on October 11-12, 2005. The report contains an overview of current conditions and practices in the library, and recommendations on future options for preservation management.

Overall, library materials appear to be in a variety of conditions, and staff have done considerable work to preserve the collections. In order to take advantage of this situation, such activities should be systematized through the implementation of policy and procedure, and coordinated by the formation of a preservation plan. This will help the library achieve successful library wide preservation projects.
II. Introduction

On October 11-12, 2005, Rebecca Elder, Amigos Adjunct Preservation Field Services Officer visited the University of Texas at Arlington to conduct a site survey and staff interviews relating to preservation management of the photographic special collections. The site visit included a physical structure survey, a general collection assessment overview, an examination of preservation staffing and activities, and interviews with Special Collections staff on disaster planning, security, and preservation management issues at the library.

Sections III - VI of this report describe the present state of the library in terms of its physical structure, the overall condition of the collections, current preservation activities, and disaster planning; included in each section is advice on correcting problems and/or advocacy for specific policies and procedures. Section VII, Future Options for Preservation Management, is concerned with setting achievable goals and objectives to most effectively and efficiently maintain the collections, and can aid the library in setting both short- and long-term goals.

III. Physical Structure

One of the most important components of a library’s preservation program is to ensure the “health” of the collections within the library’s physical structure. Poor environmental conditions are one of the leading causes of damage to library materials; second only to damage caused by use and handling of materials. Environmental considerations include the conditions under which the collection is stored (temperature, relative humidity, light levels, dust and pollutants), and the possibility of man-made and natural disasters and the library’s ability to respond to these (a topic covered later in this report).

By conducting a tour of the library facility and interviewing library staff, specific positive and negative aspects of the physical structure were observed and noted. A number of points of interest about the physical structure follow.

The Building

The building is the first defense against the outside environment and all the potential hazards: weather, pests, water, pollutants, etc. Maintaining the roof, foundation, building seams, gutters, drains, will better your investment in preserving the building and the contents within.

The Central Library was built in 1967 with one new addition of three floors. The six story structure is large and structurally sound with a tar and gravel roof. The Special Collections department is housed on the sixth floor, along with the library administrative offices.
Condition Of Roof And Drains
The building has a flat roof that was completely replaced in 2003. The building has gutters and downspouts. To the best of the library's knowledge, there have been no re-occurring leaks from the roof since the replacement of the roof. I recommend to:
- Inspect and clean the roof and drains regularly.

Seals Around Windows And Doors
Having good seals around windows and using weather-stripping at the bottom of doors will make it more difficult for pests to enter the building, and for the conditioned air to escape from the building. Seals around the doors are adequate; however, seals around some ground floor windows are deteriorating.

To better seal the library, I recommend the following:
- Caulk windows where seals are deteriorating.

Outside Grounds
Pest infestations can be encouraged by mulch and plant material build-up near and around the perimeter of the building. The best design would be to leave a three to six foot perimeter of gravel or cement around the building. In addition, pests are attracted to trash and large dumpsters near library entrances. The day of the survey the outside grounds were in good condition; however, there are plantings up to the wall on all four sides of the building, as well as trees touching the building.

To continue to discourage insects and pests from entering the building and for safety reasons, I
recommend to:

- Clean around the building and keep a three to six foot perimeter of gravel or cement around the building.
- Trim back trees where they touch the walls of the building.
The Building Environment

Temperature, relative humidity, pollution, and light all have a great impact on the rate of deterioration of library collections. They increase deteriorating chemical reactions, mold, warping, insect infestation, fading, and embrittlement. A good building environment will insure the longevity of your collections.

Temperature and Relative Humidity

The Heating, Ventilating, And Air Conditioning (HVAC) unit is an important component to a good building environment. The current HVAC unit was installed in 2003 and is an outside air handler. It is monitored using Hobo dataloggers; however, Special Collections has no control over the HVAC system. The unit has both temperature and humidity control. The unit runs 24 hours, 7 days a week, 365 days a year. As there is control in the HVAC system over the relative humidity, the indoor RH should stay stable and not follow the outdoor RH; during the winter, however, the use of heat can significantly lower the indoor RH. The only sure way to determine the performance of the HVAC is through initiating an environmental monitoring program.

The library keeps records of daily temperature and relative humidity levels. On the day of the site visit, temperature and relative humidity was recorded throughout the library.

Table 1: Temperature and Relative Humidity

<table>
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<tr>
<th>Date/Time</th>
<th>Library Section</th>
<th>Temperature</th>
<th>Relative Humidity</th>
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<td></td>
<td>Southwest Corner</td>
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<td></td>
<td>South Side</td>
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<tr>
<td></td>
<td>Southeast Corner</td>
<td>70.9</td>
<td>55%</td>
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## Appendix 1

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<th>Relative Humidity</th>
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<tr>
<td></td>
<td>South Side</td>
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<td></td>
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<td>East Entrance</td>
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<td></td>
<td>North Side</td>
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<td></td>
<td>Northwest Corner</td>
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### Indoors

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<td>44%</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram 4321</td>
<td>70.7</td>
<td>42%</td>
</tr>
<tr>
<td></td>
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<td></td>
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Table 2: Summary of data collected from Hobo dataloggers

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</table>
This data shows that there is a good deal of fluctuation in both temperature and relative humidity in all areas where photographs are stored. A stable temperature of 68-70°F is considered a good compromise between what is best for library materials and what is tolerable to people. Low temperatures and a stable, median relative humidity (between 30% to 50%) slow the chemical deterioration that causes embrittlement. Low humidity (20%) can also cause a form of embrittlement called cross-linking. However, because of potentially dry conditions in the winter, if the library chooses to provide humidification (whether throughout the building or to individual spaces), a set point of 20-25% might be more realistic and easier to achieve. For both temperature and RH, stability should be the goal. Excessive daily variations can stress materials, causing photographs to warp, crack and cockle. Daily fluctuations are often minimized by continuous operation of the HVAC system (i.e., 24 hours a day, 365 days a year). Seasonal fluctuations may be more difficult to control, but stability within a particular season should be achievable (such as 72° in the summer and 68° in the winter). In order to stabilize the environment, I recommend the library:

- Continue the established environmental monitoring program.
- Work with facilities staff to stabilize the temperature and relative humidity.

**Air Quality**

HVAC filtration should remove most particulate and provide good air quality with low pollution levels (i.e., sulphur dioxide, nitrogen dioxide, ozone).

No testing was done on atmospheric pollutants, but concentrations of acetic and nitric acids may be forming near the Fort Worth Star Telegram and WD Smith collections. These acids can catalyze deterioration reactions in currently non-deteriorated material. To be certain, further testing would be needed. I recommend:

- Relocating highly deteriorated collection materials away from non-deteriorated materials.
All visible light can quickly damage library materials and can cause fluctuations in temperature and humidity as well. Light damage is an accumulation of high light levels over a period time that can cause fading, discoloration and deterioration of photographic emulsions and paper. The two strategies used to reduce light damage are: (1) Keep light levels low by using low-ultraviolet (UV) fluorescent lamps or UV filter sleeves designed to provide vertical illumination at 2 – 5 footcandles in storage areas and 30-60 footcandles in reading areas. (2) Reduce the amount of time materials are exposed to high light levels, especially during exhibits. There are two light sources in the library: window and lamps. Sunlight creates high infrared (IR) radiation and ultraviolet (UV) radiation, which is the portion of the light spectrum most damaging to library materials. With lamps, fluorescent bulbs produce high levels of UV radiation, while, incandescent lights emit a lower ultraviolet (UV) radiation. Incandescent lights, however, emit considerable amounts of infrared (IR) radiation, which can cause materials to heat up, and they generate a lot of heat which may affect the room temperature.

There are large windows in the offices that surround the stacks area; however, the staff is well trained to keep the blinds closed. There are no windows opening directly on to the stacks area. Because of this, Special Collections is well protected from direct sunlight. Fluorescent lamps are used throughout the stacks area, and are left on when the building is occupied. Light levels from 11.3-42.1 foot-candles (fc) were recorded on a partially cloudy day. See Table 3 for more detail.

### Table 3: Recommended Light Levels

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Light Level Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td>10-50 lux (1-5 fc)</td>
</tr>
<tr>
<td>Display</td>
<td>50-150 lux (5-15 fc)</td>
</tr>
<tr>
<td>Reading/work areas</td>
<td>300-600 lux (30-60 fc)*</td>
</tr>
</tbody>
</table>

*Short exposures are recommended for paper, photographs, and other light sensitive materials.

### Table 4: Light Levels (footcandles)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Section</th>
<th>Light level (footcandles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date/Time</td>
<td>Section</td>
<td>Light level (footcandles)</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>10/11/2005 9:45 a.m.</td>
<td>Main Entrance (West)</td>
<td>525</td>
</tr>
<tr>
<td></td>
<td>Southwest Corner</td>
<td>417</td>
</tr>
<tr>
<td></td>
<td>South Side</td>
<td>495</td>
</tr>
<tr>
<td></td>
<td>Southeast Corner</td>
<td>457</td>
</tr>
<tr>
<td></td>
<td>East Entrance</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>Northeast Corner</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>North Side</td>
<td>508</td>
</tr>
<tr>
<td></td>
<td>Northwest Corner</td>
<td>296</td>
</tr>
<tr>
<td>10/11/2005 4:45 p.m.</td>
<td>Main Entrance (West)</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>Southwest Corner</td>
<td>169</td>
</tr>
<tr>
<td></td>
<td>South Side</td>
<td>Over Meter’s Limit</td>
</tr>
<tr>
<td></td>
<td>Southeast Corner</td>
<td>416</td>
</tr>
<tr>
<td></td>
<td>East Entrance</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>Northeast Corner</td>
<td>248</td>
</tr>
<tr>
<td></td>
<td>North Side</td>
<td>486</td>
</tr>
<tr>
<td></td>
<td>Northwest Corner</td>
<td>488</td>
</tr>
<tr>
<td><strong>Indoors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/11/2005 10:35 a.m.</td>
<td>Fort Worth Star Telegram 1</td>
<td>42.1</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram 1179</td>
<td>34.4</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram 4321</td>
<td>40.6</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram 4616</td>
<td>38.7</td>
</tr>
<tr>
<td>10/11/2005 11:30 a.m.</td>
<td>Fort Worth Star Telegram 6499</td>
<td>31.7</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram 7775</td>
<td>43.6</td>
</tr>
<tr>
<td></td>
<td>WD Smith Range 1</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>WD Smith Range 4</td>
<td>14.8</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram Prints box 41</td>
<td>25.6</td>
</tr>
<tr>
<td></td>
<td>Fort Worth Star Telegram Prints box 121</td>
<td>18.9</td>
</tr>
<tr>
<td>10/11/2005 1:50 p.m.</td>
<td>Fort Worth Star Telegram 1</td>
<td>39.5</td>
</tr>
</tbody>
</table>
All of the light levels fall within recommended ranges for work areas, however, not for storage areas. The photographic collections are protected from light damage because they are stored in light-tight enclosures such as boxes and cabinets; however, collections not housed in enclosures (such as books) are of greater concern.

The exhibits designer has researched lighting and recommends halogen lights. His research is accurate, and the lights he recommends may be used safely. As a caution, however, halogen lights may raise overall temperatures in the room, because they emit considerable amounts of heat. For the stacks area, it may be economically preferable to continue to use fluorescent bulbs fitted with UV-filtering sleeves.

Light damage—which is cumulative and irreversible—can be reduced by:
- Continuing to keep lights off when the building is closed/unoccupied.
- Use of UV filtering sleeves on fluorescent fixtures directly above collections (See Appendix C for a list of suppliers)

**Housekeeping**

Proper cleaning and housekeeping can also help remove dust and dirt. Dirt and debris can absorb moisture and help sustain certain insects, such as book lice. Regular cleaning, vacuuming, damp-mopping, and dusting shelves can help prevent dust and dirt from collecting, ultimately soiling materials and encouraging insect infestations. Insect carcasses also attract other insects.
On the day of the survey, no major housekeeping problems were found. The library seems to do a good job with its regular schedule of housekeeping. The only fault noted was that some of the stacks seemed dusty. I would recommend the housekeeping staff:

- Clean around all windows and doors to allow for easy visual inspection for leaks, cracks, and active pest problems etc.

- Dust/vacuum collections and shelves in Special Collections stacks areas.
- Work with Catering personnel to ensure that trash is removed promptly after functions on the sixth floor of the library.

**Space Allocation**

The Special Collections department is arranged with staff offices on the perimeter of the building, with the stacks at the center of the Special Collections area. There is collapsible shelving for some book materials. Special Collections also has three rooms off the basement lounge and off-site space in both Arlington and Austin.

Most of the shelves are full but are not currently overcrowded to the point of causing damage. There is no room for further expansion, and it is possible that Special Collections may lose some of the basement space. Because Special Collections does not foresee any new additions or building proposals in the near future, emphasis has been placed on existing space, to utilize it more efficiently. Special Collections has done an excellent job dealing with the limited space. I recommend to:

- Consider replacing cabinets housing the Fort Worth Star Telegram collection with open shelving to allow for greater height.
- Evaluate the amount of space allocated to the different parts of the collection and determine based on supply and demand the amount of space required. This may mean utilizing a more aggressive weeding program in those areas with low use and demand, to allow materials in high use and demand more space.

**Pests**

Several pests are considered enemies of library and archival material: silverfish, roaches, termites, moths, beetles, and rats. Some are considered more of a health risk; for example, roaches, rats, and birds. Others
are indicators of a much larger problem with pests or mold; for example, spiders, snakes, and book lice. To monitor for insect infestations in collection spaces and in donations, sticky traps can be used. Staff, particularly maintenance and shelvers, should be aware of the potential for infestation and should be instructed to notify the appropriate person(s) immediately upon discovery. In order to reduce the chances of insect infestations, there are a number of strategies the library can use:

- Caulk, seal, or weather-strip points of entry (cracks, gaps, windows, doors) and keep these areas clean so as to monitor pest activity.
- Keep the outside perimeter of the building clean so as not to attract insects.
- Maintain good housekeeping practices and most importantly, remove all corrugated boxes, trash, and food as they provide perfect nesting materials and food for pests and affect the indoor air quality.
- Use sticky traps in select areas of the library to monitor pest activity and in boxes of donations/gifts to determine if the material is infested before you bring it into the library.
- Use Integrated Pest Management (IPM) techniques instead of chemical sprays to control pests, primarily because the overuse and misuse of chemicals can lead to chemical tolerance of pests, and human health hazards.

On the day of the visit, no instances of insects and other pests were found during a visual inspection of the building. There has been a recent instance of roaches in the 6th floor kitchen, which shares a wall with the Special Collections stacks. Currently, the library does not monitor for pests. The library uses sprays and baits for pest control, and has discussed the importance of least toxic materials with the exterminators. Gifts are not inspected before introducing them into the collection. To ensure there is no hidden pest problem, I would recommend the following:

- Keep all windows and doors clean so as to monitor pest activity.
- Keep the outside perimeter of the building clean leaving a three to six foot perimeter of gravel or cement around the building.
- Implement a 72-hour quarantine program for donated materials. While there is no space for a quarantine room, air-tight plastic tubs make a suitable quarantine chamber. Large collections may be quarantined in a closed room well away from other collection storage areas. Many libraries like to use an area near the loading dock or service entrance to the library to avoid carrying potentially infested materials through the library.
- Use sticky traps in select areas of the library to monitor pest activity and in boxes of donations/gifts to determine if the material is infested before you bring it into the library.
- Do not allow food in staff offices.
- Consider using Integrated Pest Management (IPM) techniques to control pests.
Mold

If mold occurs in a collection, potential causes will be a problem with the HVAC system and/or moldy donations introduced into the collection. If the library is concerned about future mold growth, strategies to prevent an outbreak are as follows:

1. Run HVAC system 24 hours a day and have a backup plan in case the HVAC system goes down during the spring and summer months.

2. Use fans to increase air circulation during high humidity, because mold growth usually requires stagnant air. However, fans should be used with caution and not pointed directly on any mold-infested material, for it may spread it throughout the collection.

3. Contact a moisture control service to help dehumidify the library during times of high humidity or when the HVAC system goes out. (See Appendix C) While the use of small home dehumidifiers available from local retailers is unlikely to have much affect, using them is also unlikely to do much harm (except for the amount of electricity they use). This is because humidity cannot be lowered in one area of the building; it must be lowered throughout the building. Even in a separate room, moisture enters the room from the rest of the building through the ceiling, walls, and cracks around the doors. In order to achieve any real gains in dehumidification, the room would have to be vapor sealed. Also, dehumidifiers generate heat, which may cause localized desiccation of the library materials they are intended to protect.

4. Inspect and discard any donations with mold. Introducing mold into the collection can spread quickly to the rest of the collection.

The library has had no mold outbreaks in the building to the best of their knowledge, except for isolated individual documents (particularly Spanish manuscripts). I recommend to:

- Quarantine and inspect all incoming material and discard moldy items.
- Have a back-up plan for when the HVAC system or electricity goes out. Refer to the Section on Disaster Preparedness for more information.

IV. Collection Condition

This section of the report is not intended to provide an item-by-item evaluation, but to provide a summary of the general condition of the collections, the damage most characteristic of the library’s collections, storage, and handling practices. Even though individual items evaluated during this consultation may be in need of repair and used as an example in this report, it is ultimately the goal of this report to identify
Any special, rare, or unique items that require conservation treatment should be identified and evaluated by a conservator. See Appendix J on how to identify and select a conservator.

The photographic special collections contain approximately four million negatives and prints. Collections examined as part of this survey are:

- Fort Worth Star-Telegram Prints and Negatives
- W.D. Smith, Inc. Commercial Photography
- Squire Haskins Photograph Collection
- Basil Clemons Photograph Collection
- William S. Wood, Jr. Photograph Collection
- Arlington Citizen-Journal Negatives

A. Condition

Fort Worth Star-Telegram

The Fort Worth Star-Telegram (Fort Worth Star-Telegram) is the largest component of UTA’s photographic special collections. It consists of approximately one million negatives from the 1920s-1991, as well as a large collection of prints. The negatives are a variety of formats including 4”x5”, 2”x2”, and 35mm formats. The negatives are the area of greatest concern as they are largely on nitrate and acetate film base, are extremely prone to deterioration. This collection is used frequently, both by library patrons, as well as the staff of the Fort Worth Star-Telegram.

The negatives are stored in their original manila envelopes, often with several negatives in one envelope. Most envelopes also have highly acidic tear sheets stored in them as well.

These manila envelopes are stored in two rows in drawers in metal file cabinets. These do not provide proper support for the negatives.
Appendix 1

Upon opening the drawers (especially the ones containing the earliest materials) a strong vinegar odor is present, indicating deterioration of the acetate film. Nearly all of the acetate negatives through the 1940s exhibit some planar distortion, which is indicative of deterioration. Some negatives are already exhibiting the channeling that is the final stage of deterioration of acetate negatives.

The library has done A-D strip testing on the oldest negatives in the collection. The results are summarized in the table attached as Appendix N. A-D testing rates the rate of acetate deterioration as Stage One (fair to good), Stage Two (poor) and Stage Three (critical). While no drawers are stage three, one is approaching stage three, and six are stage two. Ten more are approaching stage two. Out of the 55 drawers surveyed, approximately 30% are showing significant deterioration, making this collection a definite priority.

By contrast, the 35mm and 2"x2" film is generally in good condition. Much of the 35mm film is stored in glassine sleeves, which is problematic because these sleeves are acidic and will hasten deterioration of the film.

The wide variety of materials that comprise this collection make both preservation and access a challenge. Ideally, each format of film would be separated and stored together. The easiest way to determine nitrate film is that it usually has the word “nitrate” along the edge. Acetate film is usually marked “safety”. As there is no index indicating which negatives are nitrate and which are acetate, and the negatives are interfiled, the only way to separate the negatives is to examine each negative individually. Any deteriorated film would be further segregated. Finally, the tear-sheets would ideally be separated from the negatives. However, this would pose huge organizational challenges.
For the Fort Worth Star-Telegram negatives, I recommend to:

- Segregate the deteriorated negatives from the rest of the collection so that acids they produce do not catalyze deterioration in currently stable negatives.

- Reformat the negatives in stage 2 and beyond onto a stable polyester film base. Consider reformatting all of the negatives up to the early 1950s. Once reformatted, the original negatives can be moved off-site. Because nitrate film is flammable, consideration should be given to discarding the nitrate negatives, once they are reformatted.

- To ease access, consider applying for grant funding to digitize the collection. While digitization is not yet a preservation strategy, it is an excellent access strategy, especially for a collection like the Fort Worth Star-Telegram negatives. In a digitized collection, the clippings could be made accessible along with the negatives (as well as digitally created positive images), allowing the clippings to be separated from the negatives. Having the collection available digitally may also ease the challenges of providing the original negatives to the Fort Worth Star Telegram upon demand.

- Rehouse the entire collection. The library will have to decide whether or not to house the tear sheets with the negatives. If the tear-sheets are housed with the negatives, they should either be encapsulated in Mylar, or have preservation photocopies created of them. Each negative should have an individual sleeve. The Library of Congress currently recommends buffered paper enclosures for most negatives. See Appendix O for more details. The 2”x2” and 35mm negatives may be housed in Mylar or polyethylene sleeves of an appropriate size. Once the clippings and negatives are sleeved appropriately, they can be housed in acid-free boxes of an appropriate size. All materials used for storing photographs and negatives must pass the Photographic Activity Test (PAT) to ensure that they will not interact with the images.

- Because the sleeving process will increase the bulk of the collection considerably, the existing cabinets will no longer be able to contain the negatives. While powder coated steel cabinets are not likely to pose great harm to the non-deteriorated portions of the collection, there is not sufficient floor space to put in enough cabinets to house the entire collection. Therefore open shelving would allow the library to maximize its limited space by allowing the storage space to increase in height.

- Cold storage would greatly increase the lifespan of this collection. If a large cold storage space is not feasible, consider acquiring freezers to use for cold storage for the most deteriorated negatives (see Appendix P for more details).
Fort Worth Star-Telegram Glass Plate Negatives

The Fort Worth Star-Telegram glass plate negatives are housed vertically in boxes, with the exception of the oversized negatives. Each glass plate has its own four flap enclosure. The boxes are housed in a metal file cabinet.

For these negatives, I recommend:

- Housing the oversized glass plates on their edges, rather than stacked on top of each other, as the weight of the negatives poses a hazard to the negatives on the bottom of the stack.
- Acquiring a library quality file cabinet to house the standard sized glass plates.

Fort Worth Star-Telegram Prints

The Fort Worth Star-Telegram prints are generally 8”x10”s and 5”x7”s. They have been processed and are housed in acid-free file folders within acid-free boxes. They are in generally good condition; however, many have had acidic tear sheets glued to the backs of the prints, which in some cases is causing discoloration to the images.

Some boxes are not quite full enough, so there is some slumping which can cause distortion to the prints.

There are several boxes of well-housed older and over-sized photographs, as well as one box of tightly rolled panoramic prints.

For the Fort Worth Star-Telegram prints, I recommend:

- Place spacers in under filled boxes to minimize slumping folders
- Consider interleaving prints with acid-free paper to absorb acids from the adhered clippings.
- Consult with a photographic
conservator about humidifying and flattening the panoramic photographs.

**W.D. Smith Commercial Photography Collection**

The W.D. Smith collection consists of approximately 200,000 negatives from 1941-1989. These are largely acetate and polyester materials in 8”x10”, 4”x5”, 5”x7” and 35mm formats. A-D strip testing has been done on them, and a significant portion has elevated levels of acetic acid.

Since the last Amigos survey, a significant rehousing project has been undertaken for the W.D. Smith collection. This consists of housing the negatives in polyester sleeves, and then housing the sleeves in individual acid-free envelopes with the indexing information printed on the exterior of the envelopes.

Much of the collection (from the 1960s forward) remains unprocessed. They are stored in the original manila envelopes. Many negatives have proofs stored with them.

For the W.D. Smith collection, I recommend to:

- Replace the polyester sleeves with buffered four-flap enclosures. The Library of Congress says “Plastic enclosures may be used for recently produced safety film negatives (acetate or polyester) that are expected to receive use. Long-term storage of acetate materials should be in buffered paper enclosures”.

- Continue processing the collection as currently processing it, with the exception of using buffered enclosures rather than plastic sleeves.

- Segregate the deteriorated negatives so that the acids they release do not catalyze further damage in undamaged film.

- Reformat the most damaged negatives so that the information on them is retained.

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1 [http://www.loc.gov/preserv/care/photolea.html](http://www.loc.gov/preserv/care/photolea.html)
Separate proofs from negatives and store them in separate areas of the library to provide redundancy in case of disaster.

This is another collection where a strong case could be made for digitization to increase access.

Cold storage is desirable for this collection.

**Basil Clemons Photograph Collection**

The Clemons collection contains approximately 20,000 prints and negatives dating from the 1920s and 1930s.

The prints are in a variety of formats, from 4”x5” to 8”x10”, and generally good condition, although they do display some expected yellowing. They are housed in acid-free folders, inside of acid-free boxes. The prints are interleaved with buffered paper. While these are excellent housing choices, many of the boxes are slightly underfull, leading to slumping of the folders and potential deformation of the print. Several boxes are also showing signs of deterioration.

For the Basil Clemons prints I recommend:

- Putting spacers in underfull boxes to minimize slumping of folders.
- Consider using boxes sized for 8”x10” prints, rather than for 8 ½” x 11” paper.
- Monitoring condition of boxes and replacing when they no longer adequately protect their contents.

The Basil Clemons negatives are nitrate and acetate, with the earliest being primarily nitrate. The nitrate negatives show the yellowing and cockling that is characteristic of the early stages of deterioration of nitrate negatives.

The acetate negatives appear in good condition and do not smell of vinegar; however, no A-D testing has been done on this collection.

For the Basil Clemons negatives I recommend to:

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Appendix 1

- Reformat deteriorating negatives before it becomes impossible to retrieve information from them.
- Randomly A-D test acetate negatives to get a baseline reading on their state of deterioration.
- House the prints and negatives in different areas of the library to provide redundancy in case of disaster.
- Cold storage is desirable for the negatives in this collection.

William S. Wood, Jr. Photograph Collection

The William S. Wood, Jr., photographic collection consists of approximately 6,500 prints and negatives dated from 1947 – 1968. Some of the prints and negatives appear to be in good condition. They are housed in acid-free folders inside acid-free document boxes, and interleaved with buffered paper. As with the Clemons collection, there is considerable slumping of folders inside their boxes. However, some of the acetate negatives are extremely deteriorated. Box 15, for example, has a strong vinegar smell and some negatives display channeling.

Special Collections has questions about potential harm caused by the ink they are using to print the identifying information on the envelopes for this collection. The surveyor consulted with a photographic conservator who believes that there is little danger posed by using an ink jet printer to print the envelopes. The biggest concern is offset of the ink to another enclosure. However, as the photographs are not exposed to the ink, they are not in danger from it. While pencil is likely a more stable medium in the long term, using a carbon-based ink would increase the stability of the printed information.

For the William S. Wood, Jr. Photograph Collection, I recommend to:
- Put spacers in under full boxes to minimize slumping.
- Consider using boxes sized for 8” x 10” prints rather than 8-1/2” x 11” paper.
- House the prints and negatives in different areas of the library to provide redundancy in case of disaster.
- Reformat acetate negatives onto a stable polyester base.
- House negatives in buffered paper enclosures.
- Separate non-photographic materials from photographic materials.
- These negatives would benefit from cold storage.

Squire Haskins Photograph Collection

The Squire Haskins photograph collection is relatively new to Special Collections. It consists of approximately 225,000 negatives from 1947-1999, and is primarily stored in one of the basement storage rooms. There are also several boxes of prints and several rolls of motion picture film.

The Squire Haskins negatives have received minimal processing since their acquisition by UTA. Currently they are housed in manila envelopes in acid-free boxes. In some boxes, rubber bands are used to keep groups of negatives together. This can cause damage to the edges of the negatives where the rubber bands pull tightly.
Strip film is housed in a variety of manners, including wrapping the negative sleeves in brown paper. Some are in glassine sleeves, and some are in plastic sleeves of an indeterminate material.

Some negatives are stored in sleeves from commercial photographic processors that are likely acidic.

The library has done A-D testing on the Squire Haskins negatives, and found that there is no evidence of vinegar syndrome in these materials.

The Squire Haskins negatives could benefit from many of the same housings as the Fort Worth Star-Telegram. I recommend to:

- House negatives individually in buffered paper enclosures (in the case of acetate sheet film) or polyester or polyethylene sleeves (in the case of 35mm film).
- House sleeved negatives in boxes of an appropriate size.
- Remove rubber bands immediately, and use index dividers to separate groups of negatives.
- These negatives would benefit from cold storage.

The Squire Haskins prints have been processed. Each print is housed in a polyester sleeve. They are then housed within acid-free file folders and file boxes. This collection is in excellent shape overall.

For the Squire Haskins prints, I recommend to:
- Add spacers to partially empty boxes to minimize slumping
- Consider using boxes sized for 8”x10” prints, rather than 8 ½”x11” paper.

Much of the Squire Haskins 16 millimeter motion picture film is in an advanced state of deterioration, and film canisters smell strongly of vinegar when opened. There is much distortion and even blocking of some of the film.
This film may be home movies (one canister is marked “Haskins Kids in Mexico”), and therefore of questionable value to the collection.

For the Squire Haskins motion picture film I recommend to:
- Determine which film has value to the collection and deaccession any film that is of negligible value.
- Perform A-D testing on all film to determine its state of deterioration.
- Reformat deteriorated film that has value to the collection.

**Arlington Citizen-Journal**
The Arlington Citizen-Journal collection consists of approximately 325,000 negatives. The negatives are stored in records center boxes in two layers of two rows each. The earliest negatives are from 1946 and the latest are from the 1990s. These are primarily acetate and polyester negatives in 4"x5" and 35mm formats.

The negatives are currently housed in regular mailing envelopes, generally with several negatives to each envelope. Some of the 35mm negatives are housed in glassine sleeves; however, most are in sleeves of an undetermined plastic.

The earliest box is in particularly bad condition, showing evidence of mold, water damage and blocking together of many negatives. The easiest way to determine nitrate film is that it usually has the word “nitrate” along the edge. Acetate film is usually marked “safety”. As there is no index indicating which negatives are nitrate and which are acetate, and the negatives are interfiled, the only way to separate the negatives is to examine each negative individually. Any deteriorated film would be further segregated.

Other boxes show similar damage, but to a lesser extent. There is no active mold; however, if the humidity rises above 65% for 3 or more days, dormant mold could become active again.

Many of the negatives show planar distortion. It is difficult to say whether this is from poor storage or deterioration of the plastic supports of the negatives. There is no vinegar smell from any of the boxes; however, they are well ventilated and acids may not have had the chance to build up to the point where they are detectable. These negatives have never been A-D tested.
These negatives would benefit from the same storage procedures as the Fort Worth Star-Telegram. I recommend to:

- House negatives individually in buffered paper enclosures (in the case of acetate sheet film) or polyester or polyethylene sleeves (in the case of 35mm film).
- House sleeved negatives in boxes of an appropriate size.
- These negatives would benefit from cold storage.
- Reformat the negatives that show evidence of mold and deaccession the originals so that the mold is removed from the collection.

V. Preservation Staff and Activities

At present, preservation activities in the Special Collections area include processing, maintaining a good environment, staff and user education, disaster planning and security. The following section will address some of the preservation activities not covered in the previous sections of this report highlighting those that are lacking, in need of expanding, and which should be reevaluated.

Reformatting

Reformatting allows fragile or damaged material to be copied onto a more stable format for future users. This allows the library to preserve the content of the original item and to provide access without exposing the original to potential damage. Creating microfilm of deteriorating newspapers and photocopying newspaper clippings for a vertical file are just two examples of how reformatting can be used. The deteriorating negatives in UTA’s collection would benefit from copying the deteriorated material onto a stable polyester base.

Staff and User Education

Staff and user education in preservation is necessary to prevent damage to materials from poor handling, and shelving practices. Most of the staff has received training in care and handling of materials. Patrons are supervised in the reading room and issued cotton gloves for handling photographic materials. For ideas on educational materials and training, three useful items are Jeanne M. Drewes and Julie A. Page. *Promoting Preservation Awareness in Libraries: A Sourcebook for Academic, Public, School, and Special Collections.* Westport, CT: Green wood, 1997; Wesley Boomgaard, *Staff Training and User Awareness in Preservation Management.* Washington, D.C.: SPEC KIT 116. Washington, D.C.: Association of Research Libraries, 1993; and *Staff and User Education.* Atlanta, GA: SOLINET, 1998. (See Appendix F). The Amigos Preservation Service has video cassettes which can be used as part of a staff and user education program; the videos can be borrowed through interlibrary loan free of charge. (See Appendix L)
Gift and Donation Inspection
Gifts and donations should be inspected in an isolated area away from collection spaces before they are processed to prevent the spread of mold and insect infestation. These materials should be inspected for damage so they can be repaired, or even withdrawn, before they are cataloged and placed on the shelf.

VI. Disaster Planning and Security
Developing and implementing a Disaster Preparedness and Recovery Plan for protecting and salvaging library materials in the event of a disaster should be considered a priority. The library is located in an area with many natural threats, each capable of causing both minor and large-scale damage to the library and its collections. The library currently has a disaster plan; however, it has not been updated since 1996.

The disaster plan should contain information on how library administration and staff can deal with specific disaster situations. To be practical and useable, the plan should include specific information (descriptions/instructions) on activities library staff must undertake in the even of an emergency. Library staff procedures in fire, water, tornado, earthquake, medical emergency, and bomb threat situation should be outlined separately. Floor plans of the building should be incorporated into the plan, with possible problem areas highlighted. The scenarios should be at the front of the report for quick reference. Some history of the building, as well as current site survey information which might note structural problems or collection storage concerns, should be included in the plan.

The plan should include a list of suppliers and disaster recovery resources. Local resources such as hardware stores, plumbers, and paper suppliers should be included along with those resources that would be needed in a major disaster recovery effort. The most important phone numbers and contacts in both the library and/or archive should be located at the very front of the report. Other “secondary” phone numbers can be included in the test of the report or in appendices.

Additional points regarding disaster preparedness and points relating to the security of collection materials are addressed below:
• There is a concern with security on the sixth floor after hours. The campus police enter Special Collections without authorization, and sometimes neglect to secure the floor after functions. Library administration should work with the police to alleviate these problems.

VII. Future Options for Preservation
There are a number of available options for expanding and structuring the library’s preservation program. Some of the recommendations made in this report require relatively little or no cost to implement; rather,
they entail changes in practices and policies. However, some will require more planning and financial investment on the part of the library.

Before evaluating the recommendations, the strengths of the current program must be considered and the needs of the collection prioritized. This will aid in establishing reasonable short- and long-term goals. The greatest strength of the preservation program is the interest and concern library staff demonstrates for the collection. The needs of the collection—the top priorities—revolve around preventive maintenance procedures (properly maintaining materials on the shelves, following proper shelving techniques, etc.) followed by the need to provide better environmental conditions.

Most beneficial immediately would be consideration of sources for grant funding to help with the financial pressures that large rehousing and reformatting projects entail. Many collections assessed in this survey would make exciting combination digitization/reformatting projects. Some potential grantors include:

- Institute of Museum and Library Services. Provides grants for preservation and digitization projects.
- National Historical Publications and Records Commission. Provides funding to help identify, preserve and provide access to materials that document American history.
- Corporate funding should also be pursued, especially for companies that have large amounts of materials stored at UTA.

Special Collections is also very interested in the future possibility of cold storage for their photographic negatives. Photographic materials deteriorate quickly and cold storage slows the process. While conventional freezers can provide cold storage for a limited number of negatives, a collection the size of UTA’s would merit a separate cold storage facility. This facility could be located on site in the basement room, or off site. In either case, it is important to make sure that there is room in the cold storage facility to accommodate future collection growth. In planning and designing the cold storage facility, UTA should engage the services of a firm well versed in creating cold storage environments for libraries and archives.

**Summary**

In general, the establishment of plans and policies in the areas mentioned in this report, can ensure that the preservation practices for the University of Texas at Arlington’s Photographic Special Collections will ensure a long and useful life for these important materials.
Amigos Imaging and Preservation Services was glad to be of assistance in this preservation-consulting project, and will be happy to provide further assistance in the implementation of any portion of the plans set forth in this report.
A-D strips are dye-coated paper strips developed by the Image Permanence Institute to detect and measure the severity of acetate negative deterioration. The small strips, after being placed in a drawer or container of acetate film, will change in color on a gradient scale from their original blue, to blue-green, then green, yellow-green and finally to goldenrod, depending on the level of acidity detected. For further information on A-D Strips and testing procedures, see: http://www.imagepermanenceinstitute.org/sh.html_sub/cat_adstrips.asp

Since 2004, the acidity levels in our Fort Worth Star-Telegram negatives have been tested on five occasions: November 2004, March 2005, September 2006, May 2008, and October 2010. The test results, summarized below, show that the degradation is advancing and is greater than we feared. Color charts depicting the testing results follow this summary page.

**November 2004:**
- 36 drawers tested (1935-1949)
- 1 drawer approaching critical Stage 3 (2.7%)
- 7 drawers in poor condition, Stage 2 (19.4%)
- 28 drawers in fair condition, Stage 1, degradation begun (77.7%)

**March 2005:**
- 56 drawers tested (1935-1952)
- 1 drawer in critical condition, Stage 2+ approach Stage 3 (1.8%)
- 6 drawers in poor condition, Stage 2 (10.7%)
- 10 drawers in approaching poor, Stage 1+ (27.8%)
- 39 drawers in fair condition, Stage 1, degradation begun (69.7%)

**September 2006:**
- 7 drawers tested (1935-1945)
- 1 drawer in critical condition, Stage 2+ approach Stage 3 (14.28%)
- 3 drawers in poor condition, Stage 2 (42.85%)
- 3 drawers in approaching poor, Stage 1+ (42.85%)

**May 2008:**
- 91 drawers tested (1935-1955)
- 6 drawers in critical condition, Stage 2+ approach Stage 3 (6.6%)
- 4 drawers in poor condition, Stage 2 (4.4%)
- 23 drawers in approaching poor, Stage 1+ (25.3%)
- 58 drawers in fair condition, Stage 1, degradation begun (63.7%)

**October 2010:**
- 91 drawers tested (1935-1955)
- 6 drawers in critical condition, Stage 2+ approach Stage 3 (6.6%)
- 8 drawers in poor condition, Stage 2 (8.8%)
- 36 drawers in approaching poor, Stage 1+ (39.6%)
- 41 drawers in fair condition, Stage 1, degradation begun (45%)
Fort Worth Star-Telegram
A-D Strip Test Results: Cabinets 1-6
November 12-18, 2004

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<thead>
<tr>
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**Key**

Yellow: Stage 1: Fair to Good Film Condition, Deterioration starting. Cold storage recommended. Monitor closely.


**Note:** The contents of the drawers shown here are different than those in subsequent years. The arrangement of the negatives was changed in 2005 to reflect their correct chronological order.
## Appendix 1

### Fort Worth Star-Telegram

**A-D Strip Test Results: Cabinets 1-7**  
March 22, 2005

<table>
<thead>
<tr>
<th>Cabinet 1</th>
<th>Cabinet 2</th>
<th>Cabinet 3</th>
<th>Cabinet 4</th>
<th>Cabinet 5</th>
<th>Cabinet 6</th>
<th>Cabinet 7</th>
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<td><strong>Drawer 1</strong>&lt;br&gt;#1-443&lt;br&gt;1935-1937</td>
<td><strong>Drawer 8</strong>&lt;br&gt;#299-318&lt;br&gt;1941-1945</td>
<td><strong>Drawer 16</strong>&lt;br&gt;#612-644&lt;br&gt;1941-1945</td>
<td><strong>Drawer 24</strong>&lt;br&gt;#1288-1337&lt;br&gt;1940-1943</td>
<td><strong>Drawer 32</strong>&lt;br&gt;#1723-1763&lt;br&gt;1942-1945</td>
<td><strong>Drawer 40</strong>&lt;br&gt;#2010-2033&lt;br&gt;1946-1947</td>
<td><strong>Drawer 48</strong>&lt;br&gt;#2062-2301&lt;br&gt;1948-1949</td>
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<tr>
<td><strong>Drawer 2</strong>&lt;br&gt;#444-538&lt;br&gt;1936-1937</td>
<td><strong>Drawer 9</strong>&lt;br&gt;#319-339&lt;br&gt;1943-1945</td>
<td><strong>Drawer 17</strong>&lt;br&gt;#645-789&lt;br&gt;1941-1945</td>
<td><strong>Drawer 25</strong>&lt;br&gt;#1338-1380&lt;br&gt;1941-1945</td>
<td><strong>Drawer 33</strong>&lt;br&gt;#1764-1827&lt;br&gt;1941-1945</td>
<td><strong>Drawer 41</strong>&lt;br&gt;#2034-2056&lt;br&gt;1942-1948</td>
<td><strong>Drawer 49</strong>&lt;br&gt;#2302-2342&lt;br&gt;1945-1949</td>
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<tr>
<td><strong>Drawer 3</strong>&lt;br&gt;#539-708&lt;br&gt;1937-1938</td>
<td><strong>Drawer 10</strong>&lt;br&gt;#340-363&lt;br&gt;1944-1946</td>
<td><strong>Drawer 18</strong>&lt;br&gt;#791-1011&lt;br&gt;1940-1945</td>
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<td><strong>Drawer 42</strong>&lt;br&gt;#2057-2090&lt;br&gt;1942-1949</td>
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<td><strong>Drawer 4</strong>&lt;br&gt;#710-940&lt;br&gt;1937-1939</td>
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<td><strong>Drawer 19</strong>&lt;br&gt;#1012-1108&lt;br&gt;1940-1945</td>
<td><strong>Drawer 27</strong>&lt;br&gt;#1417-1452&lt;br&gt;1941-1947</td>
<td><strong>Drawer 35</strong>&lt;br&gt;#1857-1893&lt;br&gt;1946-1947</td>
<td><strong>Drawer 43</strong>&lt;br&gt;#2091-2123&lt;br&gt;1947-1948</td>
<td><strong>Drawer 51</strong>&lt;br&gt;#3008-3032&lt;br&gt;1944-1948</td>
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<td><strong>Drawer 5</strong>&lt;br&gt;#941-1062&lt;br&gt;1937-1939</td>
<td><strong>Drawer 12</strong>&lt;br&gt;#387-407&lt;br&gt;1941-1946</td>
<td><strong>Drawer 20</strong>&lt;br&gt;#1109-1156&lt;br&gt;1940-1945</td>
<td><strong>Drawer 28</strong>&lt;br&gt;#1463-1522&lt;br&gt;1941-1943</td>
<td><strong>Drawer 36</strong>&lt;br&gt;#1894-1924&lt;br&gt;1946-1947</td>
<td><strong>Drawer 44</strong>&lt;br&gt;#2124-2156&lt;br&gt;1948-1949</td>
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### Key

**Yellow:**  
Stage 1: Fair to Good Film Condition.  

**Peach:**  
Stage 1.5: Rapid Decay Starting  
Point of autocatalytic decay, cold or frozen storage

**Orange:**  
Stage 2-2+: Poor.  
Actively degrading. Freeze to preserve. Copying advisable.

**Red:**  
Stage 3: Critical.  
Shrinkage, warping imminent; possible handling hazard.  
Freeze immediately. Copy immediately.
Fort Worth Star-Telegram
A-D Strip Test Results: Cabinet 1
September 27, 2006

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**Key**

Yellow:  
**Stage 1:** Fair to Good Film Condition. Deterioration starting. Cold storage recommended. Monitor closely.

*Peach:*  
**Stage 1.5:** Rapid Decay Starting. Point of autocatalytic decay, cold or frozen storage.

*Orange:*  
**Stage 2-2+:** Poor. Actively degrading. Freeze to preserve. Copying advisable.

*Red:*  
**Stage 3:** Critical. Shrinkage, warping imminent; possible handling hazard. Freeze immediately. Copy immediately.
# Fort Worth Star-Telegram

**A-D Strip Test Results: Cabinets 1-7**

May 15, 2008

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## Key

**Yellow:**
- **Stage 1:** Fair to Good Film Condition.

**Peach:**
- **Stage 1+:** Approaching Stage 2 – Poor.

**Orange:**
- **Stage 2-2+:** Poor. Actively degrading. Freeze to preserve. Copying advisable.

**Red:**
- **Stage 3:** Critical.
  - Shrinkage, warping imminent; possible handling hazard. Freeze immediately. Copy immediately.
**Fort Worth Star-Telegram**  
A-D Strip Test Results: Cabinets 8-12  
May 15, 2008

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**Key**

**Yellow:**  
Stage 1: Fair to Good Film Condition.  
Deterioration starting. Cold storage recommended.  
Monitor closely.

**Peach:**  
Stage 1.5: Rapid Decay Starting  
Point of autocatalytic decay, cold or frozen storage

**Orange:**  
Stage 2-2+: Poor.  
Actively degrading. Freeze to preserve. Copying advisable.

**Red:**  
Stage 3: Critical.  
Shrinkage, warping imminent; possible handling hazard.  
Freeze immediately. Copy immediately.
## Fort Worth Star-Telegram
### A-D Strip Test Results: Cabinets 1-7
#### October 15, 2010

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### Key

- **Yellow:**
  - Stage 1: Fair to Good Film Condition.
  - Stage 1.5: Deterioration starting. Cold storage recommended. Monitor closely.

- **Peach:**
  - Stage 2.5: Rapid Decay Starting
  - Stage 2-3+: Point of autocatalytic decay, cold or frozen storage

- **Orange:**
  - Stage 2-3+: Poor
  - Stage 2-3+: Actively degrading. Freeze to preserve. Copying advisable.

- **Red:**
  - Stage 3: Critical
  - Stage 3: Shrinkage, warping imminent; possible handling hazard.
  - Stage 3: Freeze immediately. Copy immediately.
## Fort Worth Star-Telegram Project

**A-D Strip Test Results: Cabinets 8-12**  
**October 15, 2010**

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**Key**

- **Yellow:**  
  - **Stage 1:**  
    - Fair to Good Film Condition.  
    - Deterioration starting. Cold storage recommended.  
    - Monitor closely.

- **Peach:**  
  - **Stage 1.5:**  
    - Rapid Decay Starting  
    - Point of autocatalytic decay, cold or frozen storage

- **Orange:**  
  - **Stage 2-2+:**  
    - Poor.  
    - Actively degrading. Freeze to preserve. Copying advisable.

- **Red:**  
  - **Stage 3:**  
    - Critical.  
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    - Freeze immediately. Copy immediately.


Institutional Plans and Policies

UT Arlington FY2009-2011 Strategic Plan Overview

UT Arlington Strategic Plan Initiative 5.1.3 Scope Statement Excerpt

Special Collections Collection Development Policy
Goal 1: Teach our users to discover, evaluate and use information and technology resources as integral parts of academic discourse and scholarship.

- 1.1. Increase information fluency and research skills.

1.1.1. Identify non-course-related library workshops related to research and scholarship and develop a means to sustain and market them.

1.1.2. Investigate and recommend the creation of digital learning objects that address information fluency and research skills.

- 1.2. Increase growth opportunities for instructional staff.

1.2.1. Develop a workshop series related to instruction (pedagogy, assessment, etc.).

Goal 2: Make our resources and services known to our user communities.

- 2.1. Increase the visibility of the Library.

2.1.1. Develop a comprehensive marketing plan.

- 2.2. Increase Library staff awareness of Library activities and processes.

2.2.1. Investigate and recommend methods for making communication more effective.

Goal 3: Promote awareness of scholarly communication trends and facilitate the faculty’s participation in open access initiatives.

- 3.1. Library staff will be knowledgeable resources for scholarly communication issues.

3.1.1. Educate library staff about the trends and issues regarding scholarly communications so that they can serve as resources for the faculty and advocates for open access.

- 3.2. Increase the faculty’s and administration’s awareness of changes in scholarly communication.

3.2.1. Expand communication efforts to faculty and the administration about scholarly communication issues.

- 3.3. Provide opportunities for faculty contributions in open access sources.

3.3.1. Develop incentives to encourage faculty to distribute their work in open access sources.

Goal 4: Provide digital services that enhance learning and research.

- 4.1. Increase user success in discovering resources.
**Appendix 2**

4.1.1. Investigate and recommend a next-generation OPAC.

4.1.2. Investigate and recommend RFID for possible implementation.

4.1.3. Perform an inventory of the print material in Central to enhance accuracy in the Voyager database.

- 4.2. Increase digital content.

4.2.1. Develop and establish the framework for the Institutional Repository.

4.2.2. Add one digital collection per year of our unique library materials to the Institutional repository.

- 4.3. Modernize the website so that it successfully communicates with and engages our users.

4.3.1. Review the current website in preparation to adopt the Campus Content Management System (CMS).

**Goal 5**: Provide Library physical space that satisfies users’ needs and improves operations.

- 5.1. Optimize learning environments.

5.1.1. Identify and implement the practicable portions of the 07/08 space recommendations.

5.1.2. Redesign the Architecture & Fine Arts Library to incorporate additional space.

5.1.3. Address the need for cold storage to preserve the negatives in Special Collections.
Strategy: Address the need for cold storage to preserve the negatives in Special Collections.

Description: This strategy will result in the writing of a plan to construct a cold storage facility to retard the deterioration of more than four million photographic negatives in Special Collections. The negatives reside in a variety of collections...[some of which are described on page 6 of this proposal]. Also at risk and standing to benefit from cold storage are color photographic prints, slides, oral history interview recordings, and tapes of local television programming.

Justification: Under current storage conditions, negatives held in Special Collections are degrading rapidly and will become unusable within a short period of time. With implementation of cold and/or frozen storage, the usable life of negatives can be extended dramatically. The negatives at risk are among Special Collection's most heavily used resources.

Our negatives are stored in substandard environmental conditions. Average temperature and humidity readings in Special Collections' archives storage area over the last three years have been 70 degrees and 39 percent. Temperature has fluctuated between 66.96 and 74.53 degrees; humidity has varied from 23.40 to 63.20 percent. Inadequate control of temperature and humidity in storage areas is known to cause physical degradation of negatives and accelerate chemical decay. Our 70 degree average temperature reading is two degrees higher than what the Image Permanence Institute defines as room temperature and identifies as "likely to cause significant damage." The Preservation Index for the archives climate ranges from 26-50 years, while that of the proposed cold and cool vaults would be 1,000 and 225 years, respectively.

Degraded negatives rapidly become unusable because the image-bearing layer separates from its carrier, meaning that an affected negative no longer will reproduce an undamaged image. Vinegar syndrome and other signs of physical deterioration have been documented in the Star-Telegram collection in negatives created as late as the 1950s and also have been observed in the W. D. Smith, Wood, and Squire Haskins collections.

According to the Image Permanence Institute’s Storage Guide for Acetate Film, at 70 degrees Fahrenheit and 40% relative humidity the time to onset of vinegar syndrome for a fresh triacetate negative is 50 years. At the same level of humidity, storage at 40 degrees delays the onset of vinegar syndrome to 450 years and storage at 30 degrees extends it to 1,000 years, clearly illustrating the beneficial effects of reduced storage temperatures.

Assessment: Success constitutes the creation of a plan for a cost effective facility that meets our specifications for cold storage to sustain the existence of and access to more than five million historical photographic images held in Special Collections. This plan, which aims to ensure that the negatives will not be lost as a resource for study and research, supports the Library's goal to provide physical space that satisfies users’ needs and improves operations.
Purpose: Special Collections supports the courses of study offered and anticipated by the university at the undergraduate, graduate, and post graduate levels in the areas of Texas studies, geography and historical cartography, and, to a more limited extent, Mexican studies. Special Collections also provides resource materials needed for independent scholarly research to students, faculty, and the general public.

Special Collections' goal is to establish and maintain special collections of materials which are distinctive to the region, provide archival support to the University, or fulfill the obligation of the University Libraries to preserve rare and special materials. To these ends, Special Collections collects, as exhaustively as possible within budget limitations, all library and archival materials relating to Texas, the U.S. War with Mexico (1846-1848), The University of Texas at Arlington, and Mexico from 1810-1920. Additionally, Special Collections collects, as exhaustively as possible, maps, charts, atlases, and other printed and manuscript items depicting the cartographic history of Texas, the Gulf of Mexico region, and the Greater Southwest.

Though Special Collections has a number of components (please see Special Collections at The University of Texas at Arlington Libraries: A Guide, Arlington: The University of Texas at Arlington, 1989, compiled by Special Collections Staff and edited by Gerald D. Saxon, pp. 4-8, for a brief history of Special Collections), this policy is divided into major collecting areas rather than by section. In this way, collecting priorities, which may transcend a single section, can be clearly articulated. The collecting areas discussed in the policy are: Texas, the U.S. War with Mexico (1846-1848), Mexico, Cartographic History (including maps), Labor and Politics, University, and Special Collections.

TEXAS

Special Collections' Texas Collection includes both published and unpublished material. We actively collect such printed material as books, serials, newspapers, broadsides and broadsheets, graphics, maps (see section on CARTOGRAPHIC HISTORY), sheet music, and microforms. Additionally, we collect manuscript and archival records, oral history interviews, photographs and negatives, videotape, and other media.

General Collection Guidelines:

- **Language:** English is the primary language of the material in the Texas Collection. Spanish is also emphasized; German and French are also collected. Non-English writings are purchased in English translation as well as in the original language, when available.

- **Chronological Guidelines:** No limits.

- **Geographical Guidelines:** Primarily Texas, but including as a lower priority works dealing with the history of the American Southwest (New Mexico and Arizona). Special emphasis shall be on the immediate Fort Worth/Arlington/Dallas area and surrounding counties, as well as the thirty counties which were once a part of the Robertson Colony. Please see the Appendix for a list of these counties.
• **Treatment of Subject:** Primary emphasis is on material treating some aspect of Texas as a subject. Juvenile material may be included, especially when it is from the immediate geographic area or is one of a few books available on that aspect of Texas. Original literary works (including fiction, poetry, drama, essays, and humor) which are by specific Texas authors or about Texas subjects are collected as completely as possible, including critical and historical studies dealing with such literature. Collected authors should have acknowledged identities as Texans or strong associations with Texas. Books written by authors who were merely born in Texas or who have marginal association with the state will usually be acquired only if the subject is Texas. Books published in Texas on non-Texas subjects will not normally be acquired unless there is some other Texas significance, e.g., printer, illustrator, etc.

• **Types of Materials:** Materials acquired include printed items, books, pamphlets, serials, sheet music, directories, broadsides and broadsheets, maps (see section on [CARTOGRAPHIC HISTORY](#)), newspapers, media in all formats, graphics, publications in microform, manuscripts and archives, photographs and negatives, newspaper clippings, and machine readable records. Dictionaries, encyclopedias, almanacs, biographical directories, etc., of a general nature will be purchased selectively. Cookbooks are acquired very selectively and should either include local history information or be historically significant. Genealogical works will be acquired selectively when they deal with Texas in general or with local history of the North and Central Texas regions in particular. Family histories that are primarily genealogical in nature will be purchased only if the family has long-time Texas connections. Local and county histories will be collected exhaustively. The collecting emphasis shall be on primary source material first, secondary sources second.

• **Date of Publication:** Both current and retrospective purchases are made, including original printings and editions. Emphasis will be on exhaustive purchases of current material and as exhaustively as possible due to budget limitations of retrospective material.

• **Other General Considerations:** Special Collections is part of the Regional Historical Resource Depository (RHRD) system administered by the Texas State Library. As an RHRD, Special Collections houses the historical records for the counties of Collin, Ellis, Henderson, Hood, Johnson, Kaufman, Navarro, Parker, Rockwall, Somervell, and Tarrant. There is some duplication of book material with Central Library, Architecture & Fine Arts Library, and Science & Engineering Library. Many books on tangential subjects will be located in one of these other libraries on campus. Special Collections’ Texas holdings are complemented by materials in other area libraries, notably the Dallas Public Library, Fort Worth Public Library, Dallas Historical Society, DeGolyer Library at Southern Methodist University, University of North Texas Library, and Texas Woman’s University Library. Other notable Texas collections in the state are the Barker Texas History Center at The University of Texas at Austin, the Texas Collection at Baylor University, the Southwest Collection at Texas Tech University, the Rosenberg Library at Galveston, and the Daughters of the Republic of Texas Library at the Alamo.
• **Observations and Qualifications by Subject Subdivision:** Materials relating to Texas history subjects will be collected as exhaustively as possible within the restrictions outlined above. Works of a general nature pertaining to Texas and local and county histories will be collected to an exhaustive level. Materials relating to the Fort Worth/Arlington/Dallas area and North and Central Texas will also be exhaustively collected. Materials by Texas authors will be collected as specified above. Highly technical works are not collected.

U.S. War with Mexico (1846-1848)

Special Collections' U.S. War with Mexico (1946-1848) Collection includes both published and unpublished material. We actively collect historical sources, both published and unpublished, from Mexico and the United States which reflect each country's view of the conflict. Among the types of materials collected are books, serials, pamphlets, government documents, broadsides and broadsheets, general orders, prints and lithographs, sheet music, manuscripts, maps (see section on CARTOGRAPHIC HISTORY), newspapers, and, to a lesser extent, artifacts.

General Collection Guidelines:

• **Language:** English and Spanish are the primary languages of the material. Non-English writings are purchased in English translation as well as in the original language, when available.

• **Chronological Guidelines:** Primarily the years 1846-1848.

• **Geographical Guidelines:** Emphasis shall be on the nations involved in the war -- Mexico and the United States.

• **Treatment of Subject:** All aspects of the war will be collected exhaustively, including material reflecting the war's causes, its progress, and its consequences. Works of fiction, literature, poetry, and drama written about the war will also be collected. Biographies and autobiographies of individuals who fought in the war will be collected exhaustively. Graphic depictions of the war and its participants as well as musical pieces commemorating battles and individuals associated with the war will also be collected exhaustively. Materials reflecting both the United States' and Mexico's viewpoints will be actively collected. Primary and secondary sources will be collected exhaustively.

• **Types of Materials:** Materials acquired include books, serials, pamphlets, government documents, broadsides and broadsheets, general orders, prints, sheet music, manuscripts, daguerreotypes, maps (see section on CARTOGRAPHIC HISTORY), newspapers, and microforms. Artifacts are not actively solicited but may be accepted as donations or as part of manuscript collections. Dictionaries, encyclopedias, almanacs, biographical directories, etc., of a general nature will be purchased selectively. Media and audio-visual materials with the war as their focus will be collected.

• **Date of Publication:** Both current and retrospective purchases are made, including original printings and editions.
**APPENDIX 2**

- **Other General Considerations:** There is some duplication of book material with Central Library and Architecture & Fine Arts Library. Institutions in the area with holdings which complement Special Collections’ U.S. War with Mexico (1846-1848) Collection are the Amon Carter Museum in Fort Worth (prints and daguerreotypes) and, to a lesser extent, the DeGolyer Library at Southern Methodist University. Another notable collection can be found at the Beinecke Rare Book and Manuscript Library at Yale University in New Haven, Connecticut.

- **Observations and Qualifications by Subject Subdivision:** Materials, in all formats, relating to the Mexican War will be collected exhaustively.

**MEXICO**

The Mexico Collection is a direct outgrowth of Special Collections’ interest in the U.S. War with Mexico (1846-1848), the fieldwork and microfilming done in Yucatan, and the historical bonds Texas shares with Mexico. The collecting focus for the collection is narrower than for Texana and includes material, both archival and printed, that reflects the history of Mexico from 1810 (the outbreak of the Independence movement) to 1920 (the end of the Mexican Revolution).

Special Collections has done extensive microfilming of archives in Honduras, but currently it does not actively collect printed material for that country.

**General Collection Guidelines:**

- **Language:** English and Spanish are the primary languages of the material. Other languages, most notably French, may be collected. Non-English writings are purchased in English translation as well as in the original language.

- **Chronological Guidelines:** Primarily the years 1810-1920.

- **Geographical Guidelines:** Emphasis shall be on Mexico as a whole, the northern border states, the Federal District, and Yucatan.

- **Treatment of Subject:** Primary emphasis is on material dealing with the political history of Mexico, rather than the literary, economic, and social aspects of Mexican life. Primary sources shall be emphasized.

- **Types of Materials:** Materials acquired include printed items, books, pamphlets, government publications, broadsides and broadsheets, maps (see section on CARTOGRAPHIC HISTORY), newspapers, media, publications in microform, and manuscripts and archival records.

- **Date of Publication:** Both current and retrospective purchases are made, including original printings and editions. Emphasis will be to collect as exhaustively as possible within budget limitations.
• **Other General Considerations:** There may be some duplication of book material with Central Library, Architecture & Fine Arts Library, and Science & Engineering Library. Many tangential books will be located in one of these other libraries on campus. The holdings on Mexico are complemented by materials in the Fort Worth/Arlington/Dallas area at the DeGolyer Library at Southern Methodist University. Other special collections on Mexico in the state are in the Nettie Lee Benson Latin American Collection at The University of Texas at Austin, The University of Texas at El Paso Library, and The University of Texas at San Antonio Library.

• **Observations and Qualifications by Subject Subdivision:** Materials relating to the political history of Mexico from 1810 to 1920, especially primary sources both published and unpublished, will be collected as exhaustively as the budget allows.

**CARTOGRAPHIC HISTORY**

The Cartographic History Collection includes maps, charts, atlases, geographies, books and serials, and other printed and manuscript items dealing with the history of cartography and the mapping of the New World, with special emphasis on Texas, the Gulf of Mexico region, and the Greater Southwest, including Mexico.

**General Collection Guidelines:**

- **Language:** English, Spanish, French, German, and Latin are the primary languages of the collection, but maps and other material in all languages are considered provided they depict or discuss the collection’s area of focus. Non-English writings are also purchased in English translation as well as in the original language.

- **Chronological Guidelines:** Emphasis is placed on the period 1492-1900, but maps of Texas for all years will be collected.

- **Geographical Guidelines:** In order of priority: Texas; the Gulf of Mexico region; the Greater Southwest, including Mexico; North America; the Western Hemisphere (New World); and the world.

- **Treatment of Subject:** Political, transportation, travel, promotional, outline, and base maps are collected as exhaustively as possible for the above geographical focus. Portolan charts and other navigational charts are selectively collected as are manuscript maps. Pocket maps, thematic maps, and atlases are acquired according to subject and geographical guidelines, with emphasis given to economic, historical, linguistic, demographic, and transportation maps and atlases. Current editions of road and travel atlases are selectively acquired, as are school maps or atlases and juvenile materials. Some topographic maps are collected by Special Collections.

- **Types of Materials:** Because of the varied informational needs to be met by the Cartographic History Collection, many types of materials are required, including selected reference works, such as bibliographies, indexes, reference guides, gazetteers, dictionaries
of geographic and cartographic terms, and biographical directories of cartographers; maps, both printed and manuscript, and navigational charts; books, serials, pamphlets, and government publications; map catalogs; road maps, city plans, pocket maps, and insurance maps; facsimiles; and atlases. Wall maps and globes are acquired on a very selective basis. Publications in microform and media may be acquired.

- **Date of Publication:** Both current and retrospective purchases will be made, including original printings and editions, when possible. Material already in other areas of Special Collections will not be duplicated.

- **Other General Considerations:** There may be some limited duplication of book and map material in the Central Library, especially in the Government Documents section. The emphasis of the Cartographic History Collection, however, is to show the historical development of Texas, the Gulf of Mexico region, and the Greater Southwest. In this way, the collection complements and supplements the other collecting areas of Special Collections. Only in rare cases will maps or materials outside of the geographical and chronological focus discussed above be purchased or accepted in donation.

**LABOR AND POLITICS**

The Texas Labor Archives consists primarily of archival and manuscript material from Texas labor unions, such as correspondence, minutes, proceedings, oral history tapes and transcripts, charters, serials, photographs, film, newspapers, and memorabilia. In the late 1960s, the focus of the archives was expanded to include political collections. Because unions are constantly involved in political activity of one kind or another, the move to acquire political material was a natural step. The sheer size of modern political collections has forced the archives to limit its collecting interests to the papers of elected officials primarily from the North and Central Texas area. In addition, the archives collects the records of political action groups and the personal papers and collections of political activists.

**General Collection Guidelines:**

- **Languages:** English is the primary language of the collections. Materials in Spanish may also be included.

- **Chronological Guidelines:** No limits, but the bulk of the material dates from 1890-current.

- **Geographical Guidelines:** Texas primarily, but significant regional and national labor collections will be considered provided there is some tie to the state. Political collections will be restricted to the papers of elected officials from North and Central Texas.

- **Treatment of Subject:** Primary emphasis is on material produced by Texas unions, union officials, law firms specializing in labor cases, political action groups, advocacy organizations like the Texas Civil Liberties Union, and elected officials and political activists from the North and Central Texas area.
Types of Materials: Materials acquired include archival records, such as correspondence, financial reports, minutes, charters, constitutions, legal documents, by-laws, oral history interviews, scrapbooks, newsletters and newspapers, photographs and negatives, certificates, posters, cassette tapes, film, and microform. Published and printed material relating to the Texas labor movement will also be collected exhaustively, including books, serials, theses, dissertations, microform sets, pamphlets, and audio-visual material.

Date of Publication: Both current and retrospective items will be collected.

Other General Considerations: Material relating to the American and international labor movement can be found in Central Library. The holdings of the Texas Labor Archives are complemented by collections at the Southern Labor Archives at Georgia State University in Atlanta, the Walter P. Reuther Library at Wayne State University in Detroit, and the George Meany Center for Labor Studies in Silver Spring, Maryland. Complementary political collections can be found above (see section on TEXAS, e.g. Other General Considerations).

UNIVERSITY

Special Collections serves as the archives for The University of Texas at Arlington. As such, we acquire university records that are judged to have enduring historical value. Additionally, we collect the records of UT Arlington’s forerunner schools, beginning with Arlington College, a private institution founded in 1895. The university material is primarily archival in nature and includes correspondence, memoranda, financial and statistical reports, budgets, minutes, photographs and negatives, slides, oral history interviews, plans, proposals, scrapbooks, and computer generated records. Printed material such as university publications, newspapers and newsletters, yearbooks, and university catalogs are also collected. Artifacts are not actively solicited.

General Collection Guidelines:

Language: English is the primary language of the material in the University Archives.

Chronological Guidelines: 1895-current.


Treatment of Subject: Emphasis is placed on collections that reflect the development of the university and its forerunners. Special emphasis will be on collecting the records of key policy-makers at the university, such as the President and the Vice President for Academic Affairs. Because of the role that the News and Information Office plays in gathering and disseminating information about the university, its records, photographs, slides, and negatives are aggressively sought. The papers of faculty members are not actively collected unless they reflect the growth and development of the university as a whole.

Types of Materials: Materials in various formats are collected, including annuals, books, newsletters and newspapers, catalogs, correspondence and office files, reports of all kinds, budgets, memoranda, minutes, photographs and negatives, slides, oral history interviews,
APPENDIX 2

plans, proposals, scrapbooks, and computer generated records. Artifacts are not collected, except in rare cases.

- **Date of Publication:** No limits.

- **Other General Considerations:** Because the university as yet has no official records management program, offices across campus are responsible for maintaining and disposing of their own records within state guidelines and university policy. As a result, historically significant records will likely be located in a number of campus offices.

SPECIAL COLLECTIONS

**Purpose:** As a custodial function, Special Collections, at the request of the Metadata Services program area, may bring together books and materials in need of conservation and protection because of their fragility, format, or intrinsic value. These materials are not actively sought by Special Collections, but when they are received by the Libraries or are identified within its existing collections, they may be transferred to Special Collections following the Libraries’ transfer policy. These materials include: early imprints; materials with unusual bibliographic characteristics; materials with unusual physical characteristics; materials especially prone to loss, damage, or mutilation; and collections.

**General Collection Guidelines:**

- **Early Imprints:** These include works printed before:
  1. 1801 in England and continental Europe
  2. 1821 in the United States east of the Mississippi River, in South America, in Central America, and in Canada
  3. 1876 in the United States west of the Mississippi River
  4. 1901 in Africa, Asia, and the Pacific

- **Materials with Unusual Bibliographic Characteristics.** These include:
  1. Editions limited to 500 copies or less
  2. Significant first editions
  3. Association or autograph copies, when significant
  4. Extra-illustrated or grangerized books
  5. Works distinguished by illustrations, typography, binding, fore-edge painting, or the like

- **Materials with Unusual Physical Characteristics.** These include:
  1. Materials in unusual formats, e.g. broadsides, ephemera, playbills, portfolios, prints
  2. Materials of unusual size, e.g. large folios and miniatures
3. Other unusual characteristics, such as fragile or delicate bindings, boxes which should be preserved, or awkward shapes

- **Materials Especially Prone to Loss, Damage, or Mutilation.** These include:
  1. Volumes of fine, loose, or tipped-in plates
  2. Volumes with manuscript materials laid or tipped-in
  3. Volumes with bound or laid-in material, such as maps, subject to mutilation
  4. Erotica
  5. Other materials, as appropriate

- **Collections:** This category includes collections which must be kept together, either because of similar subject or format or because of donor stipulations.
Appendix 3

Floor Plans

UT Arlington Central Library Basement Floor Plan
Technical Specifications

Scientific Climate Systems Quote for Vault Construction
Spacesaver Quote for Vault Shelving
Wagner Furniture Cost Estimates
TO: Ann Hodges  
University of Texas  

FROM: Jeff Mitchell  
Scientific Climate Systems, Ltd

DATE: October 18, 2010  
PAGE: 1 of 8

RE: University of Texas

Dear Ann,

Please find below Scientific Climate System’s budget proposal to supply the controlled environmental archive rooms for the University of Texas, Arlington.

Our proposal is based on the supply, delivery and installation of equipment for the cool archival room Vault A and the, cold archival room Vault B. Each room is supported by mechanical systems to be located in the vault mechanical room with the condensing units to be located on the roof or on grade outside.

- Air handler (one per room)  
- Pre-filtration  
- Carbon Filtration Section (no filters)  
- DX cooling coils  
- Electric steam generating humidifier  
- Electric resistance heating  
- Air-cooled condensing units  
- Dehumidifiers  
- Supply Fan  
- Controls  
- Chart recorder  
- Installation  
- Ductwork  
- Start-up

We trust this quote will define clearly the features we are including. Upon your review, please advise if you need further details and/or clarification. We thank you for the opportunity to serve your interests.

Regards,

Jeff Mitchell  
Senior Sales Engineer  
Scientific Climate Systems, Ltd  
8208 Westpark Drive  
Houston, Texas  77063  
PH: 800-840-5778 or 713-560-5058  
Cell: 713-560-5053  
Email: jmitche@acs-usa.com

8208 Westpark Drive • Houston, TX 77063 U.S.A.  
713/781/6447 • Fax: 713/781/6449
ARCHIVAL STORAGE FOR
UNIVERSITY OF TEXAS
October 18, 2010

OVERALL RANGE:

COOL STORAGE CHAMBER

TEMPERATURE: • 50°F
TEMPERATURE TOLERANCE: • +/- 3°F at Sensor
HUMIDITY: • 35% RH
HUMIDITY TOLERANCE: • +/- 5% at humidity sensor

COLD STORAGE CHAMBER

TEMPERATURE: • 30°F
TEMPERATURE TOLERANCE: • +/- 3°F at sensor
HUMIDITY: • 30% RH
HUMIDITY TOLERANCE: • +/- 5% at humidity sensor

CHAMBER SIZE & CONSTRUCTION

OVERALL SIZE:
COOL STORAGE (Vault A): • ~20’ x 10’ x 10’ tall
COLD STORAGE (Vault B): • ~40’ x 17’ x 10’ tall

CHAMBER & DOOR CONSTRUCTION:
• Modular prefab panels insulated with 4” foamed in-place urethane walls and ceiling
## BUDGET QUOTATION

- All modular room panels are fire retardant.
- Two-way Vent. Pressure Equalization to equalize interior chamber pressure.
- R-32 Insulation value
- Air tight room
- White embossed aluminum interior and exterior
- Baked on siliconized polyester finish
- Self supporting chamber ceiling.

### FLOOR:

- Flooring systems is by others. Coordination of concrete pour and tracking system by others. SCS to supply and install vapor barrier and epoxy coating for cool/cold room floors only.

### DOOR SIZE:

- Two (2) 36” x 80” powered swing doors
- Doors to include 14” x 24” heated observation window

### MECHANICAL:

#### HEATING/REFRIGERATION SYSTEM:

- Heat / Cool Integrated Climate-Control System.
- Custom built air handlers located in mechanical room one floor below the storage rooms. Total of two air handlers will be supplied.
- Pre-filters within each air handler.
- Two carbon filter sections supplied without filters for each air handler. Filters have not been specified.
- Insulated galvanized ductwork from mechanical room to storage rooms is provided
- Factory mounted Expansion valve

---

8208 Westpark Drive • Houston, TX  77063 U.S.A.
713/781/6447 • Fax: 713/781/6449
### BUDGET QUOTATION

- Air flow uniformly provided throughout entire perimeter of room
- Coil Construction of Copper Tubes and Aluminum Fins
- Coils Tested, Dehydrated and Sealed at the Factory
- Corrosion Resistant casing and sturdy Construction for Long Life
- Sloped Drain for positive condensate Drainage
- Integrated resistance heating and control (5kW)

### CONDENSING UNITS:

- Condensing units located in the mechanical room.
- Water-cooled condensers redundant units are included
- Copeland compressors
- Ozone friendly refrigerant, E.P.A. approved as environmentally acceptable
- Welded steel framework construction
- Flooded condenser and fan cycling head pressure control
- Suction accumulator
- Factory mounted liquid line solenoid valve
- Non-fused disconnect

### HUMIDIFIER:

- Dri-Steem electric steam boiler
- Technologically advanced vapor mist
- Digital read out
- Low maintenance type
- Real time clock
- Engineered to use standard tap or RO water
- Immediate Response to Call for humidifier

---

8208 Westpark Drive • Houston, TX 77063 U.S.A.  
713/781/6447 • Fax: 713/781/6449
BUDGET QUOTATION

- Constructed of high Quality Stainless Steel
- Supply and drainage water piping is by others.

DE-HUMIDIFICATION SYSTEM:

- Munter’s De-humidifier HCD600 for Cool Storage (Vault B)
- Munter’s De-humidifier HC300 for Cold Storage (Vault A)
- Units will be in the mechanical room
- Electric reactivation
- Silica Gel wheel for constant de-humidification

CONTROLLER:

- UL rated control enclosure
- Watlow F-4D controller
- ¼ DIN
- Universal inputs
- High performance 16-bit microprocessor
- Menu customization
- High definition 4-line LCD controller interface display
- Field upgradable
- Real time clock with battery back up
- Online help screens
- 
- Pyromation temperature sensor is a platinum element RTD in a stainless steel sheath with accuracy of ±0.1% located in return air

RECORDERS:

- Vaisala humidity sensor located in return air duct
- Honeywell DR 4300 circular recorders with dual pen for each room.

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713/781/6447 • Fax: 713/781/6449
UTILITIES:

ELECTRICAL:

- Power furnished to control panel and mechanical room by others.
- Distribution of power from control panel at rooms and from a single power panel in the mechanical room by SCS.
- Standard voltages are 208/1/60 or 208/3/60, 460/3/60.
- Control voltage is 120/208V/3/60.
- NEMA 1 electrical standard compliance.
- All wiring color coded, identified with labels and enclosed in conduit or panel channel.
- Solid state relay isolated, zero voltage switching, control relays.

LIGHTS:

- By SCS.
- Fluorescent fixtures surface mounted.
- Wiring by UTA electrician.
BUDGET QUOTATION

GENERAL INFORMATION FOR EACH CHAMBER

TESTING:
- Chamber start-up and testing are included

TRAINING:
- Training of all personnel at location is included

INSTALLATION:
- By SCS’s own factory trained personnel and supervised subcontractors.

WARRANTY:
- SCS warrants all equipment manufactured by it to be free from defects in workmanship and materials for a period of one year from date of acceptance of equipment by the Owner.
- Ten (10) year warranty for all insulated panels, walls and ceiling

SERVICE:
- To be provided by local SCS technical representative

NOTE: SCS full service maintenance contracts available. Please contact the SCSI Service Department at 1-800-840-5778 for options and pricing.

SHIPMENT:

TERMS:
- 8-10 weeks after receipt of approved drawings
- Progressive
BUDGET QUOTATION

PRICE:

- $428,500.00 DELIVERED & INSTALLED

Excluded:

- All plumbing, electrical, building penetrations, chases and concrete pads by others
- Roof flashing and sealing of penetrations is by others.
- Redundancy is not included within the scope of this budget quotation
- Taxes, permits and fees not included.
- Floor drains are to be provided by others
- Drainage piping for the humidifiers is by others.
- Condensation drains/traps are supplied by others.
Spacesaver Quote and Layout for Vault Shelving

Annotations made by Wagner to Spacesaver quote below:

Option 2 [The desired shelving option—note total linear Ft on CAD]
14412-3806.pdf shows all shelving to hold boxes. Vault A will hold 3,024 boxes. Vault B 7,056 boxes.

Option 2A
14413-3806.pdf shows 30 Russ Bassett F-10 microfiche cabinets with shelving. Vault A still shelving only. Vault B will hold 5,256 boxes and the 30 cabinets will hold 3,861,000 fiche based on 160/inch. Each cabinet holds 128,700 fiche and costs about $2,000.00.

Budgets, delivered and installed:
Option 2—Vault A: $35,000  Vault B (shelving only): 90,000.00  [Total= 125,000]
Option 2a Vault A: $35,000  Vault B (cabinets and shelving) $141,000.00  [Total =176,000]

From: Karl Warner <karlw@spacesaverinfolinx.com>
To: Sarah Wagner <sarahwagner@att.net>
Sent: Thu, October 14, 2010 8:34:37 AM
Subject: RE: more info for Quote

Sarah,
Here are drawings of the vaults.
14412-3806.pdf shows all shelving to hold boxes. Vault A will hold 3,024 boxes. Vault B 7,056 boxes.

14413-3806.pdf shows 30 Russ Bassett F-10 microfiche cabinets with shelving. Vault A still shelving only. Vault B will hold 5,256 boxes and the 30 cabinets will hold 3,861,000 fiche based on 160/inch. Each cabinet holds 128,700 fiche and costs about $2,000.00.

Budgets, delivered and installed:
Vault A: $35,000
Vault B (shelving only): 90,000.00
Vault B (cabinets and shelving) $141,000.00

I hope this information is useful for your client.

Karl Warner
Spacesaver Systems, Inc.
SpacesaverInfolinx
Direct: 301-962-9929
Cell: 202-315-6687
# Wagner Cost Estimates for Office Furnishings

**Budget: UTA Cold Vault Office/Processing Area Equipment and Furnishings**

Estimated by Sarah S. Wagner LLC 10/10/2010

<table>
<thead>
<tr>
<th>Office Equipment and Furniture</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Store</th>
<th>Catalog/MFC #</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Computer (2)</td>
<td>Dell Precision T7500 Monitor/keyboard, Office</td>
<td>Dell Online Store</td>
<td>Build Your Own Z 1800.00 ea</td>
<td>5000.00</td>
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<tr>
<td>Photoshop Software</td>
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<td>Scanner</td>
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<td><strong>SUBTOTAL Office Hardware and Software</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$300.00</strong></td>
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<tr>
<td>Printer Stand</td>
<td>Safeco Scoot Under Desk Cart</td>
<td>Office Depot</td>
<td>#581-377-315 SAP1306RL</td>
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<tr>
<td>Free Standing Steel Book Cases Lt Gray</td>
<td>HON Open Front 6 Shelf 36H x 34.1/2W x 12D</td>
<td>Office Depot</td>
<td>#581-309-694 HONS2ARCO</td>
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<tr>
<td>Desk 60W x 30D Lt Gray</td>
<td>HON Metro Classic Metal Double Pedestal</td>
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<td>Stack on Desk Storage 56H x 18-1/2D x 66W</td>
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<tr>
<td>Desk Lamp (2) Full Spectrum</td>
<td>Ott Lite Thompson HD Desk Lamp Full Spectrum</td>
<td>Office Depot</td>
<td>#581-111-519 @ 62.00 ea</td>
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<td>Desk Chairs—Black (2)</td>
<td>HON 7800 Series</td>
<td>Office Depot</td>
<td>#581-995-610 @ 590.00 ea</td>
<td>1180.00</td>
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<tr>
<td>Carts (2 mln.)</td>
<td>Rubbermaid 2-Shelf Service Cart Beige</td>
<td>Office Depot</td>
<td>#581-535-077 @ 300.00 ea</td>
<td>600.00</td>
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<td>Air Purifier</td>
<td>Holmes HEPA/Activated Charcoal</td>
<td>Office Depot</td>
<td>#87876-512 HAP5242LG</td>
<td>60.00</td>
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<td>Waste Basket (2)</td>
<td>Rubbermaid</td>
<td>Office Depot</td>
<td>#581-221-681 @ 700.00 ea</td>
<td>14.00</td>
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<td>Desk Accessories</td>
<td>Essential Elements Desktop Collection</td>
<td>Office Depot</td>
<td>#581-123-417 Letter Tray 16.00 ea</td>
<td>32.00</td>
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<tr>
<td><strong>SUBTOTAL Office Furnishings</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$4426.00</strong></td>
<td></td>
</tr>
<tr>
<td>TOTAL Workstation/Office for Cold Vault</td>
<td></td>
<td></td>
<td></td>
<td><strong>$9726.00</strong></td>
<td></td>
</tr>
</tbody>
</table>
Résumés of Project Personnel
Leonard A. Bode  
1225 West Mitchell Street  
Arlington, Texas 76019  
(817) 272-3337

OBJECTIVE

Filling HVAC Supervisor for University of Texas Office of Facilities Management where the following skills and experience are being used:

- Campus Refrigeration Management  
- Facilities Construction Inspection  
- Supervision  
- Environment/Safety

QUALIFICATIONS

Thirty one years of increasing experience and responsibility in campus mechanical, utilities, maintenance and operation of facilities, environmental, and construction.

FACILITIES MANAGEMENT

- Responsible for operating and maintaining all HVAC and refrigeration related equipment in UT Arlington’s 108 buildings. Manage, monitor, maintain, and manipulate the Energy Management Control System to provide optimal utility usage while providing a comfortable environment for the students, faculty, and staff at UT Arlington.

SUPERVISION

- Supervised work of 23 mechanics and technicians. Provide direction to contractors as needed.

ENVIRONMENTAL/SAFETY

- Responsible for environmental and safety policies and guidance as related to the HVAC Shop. Developed and implemented UT Arlington’s Refrigerant Management Policy in accordance with the Environmental Protection Agency’s Clean Air Act, Title IV.

EDUCATION

- BS, Interdisciplinary Studies, UT Arlington; concentration—Business Administration, Physics, and Mathematics
CARLEEN DOLAN

Library Experience, University of Texas at Arlington Library

Administrative Manager, 2006-Present
Facilities and Procurement Manager, 1996-2006
Administrative Assistant, 1993 - 1996

Basic Job Functions and Responsibility
The purpose of this position is to oversee the seven physical library locations and to procure goods and services necessary for timely library operations. The Administrative Manager negotiates and coordinates with other University offices and with outside vendors for physical plant services, renovations, and building projects; for the procurement of supplies, equipment and other contracted services, and has overall responsibility for the maintenance of the physical condition of library spaces. This position is responsible for the Libraries’ maintenance and operations (M&O) budget and reports its status to the Library Management Team on a regular basis. The position provides support to both the Dean and Associate Director of Libraries. This position is responsible for all accounting functions and directly supervises the Libraries’ Accounting Team and mail room functions.

The characteristic duties and responsibilities are to liaison with various University offices and outside suppliers as required ensuring timely order and receipt of quality services and materials within budgetary guidelines. Order goods and services, print requests, and handles catering arrangements to meet the needs of the individual Program Areas in the Libraries’, as well as meets the needs of the users. Serves as an integral member of the Library Management Team working on long range Strategic Planning. Monitors and identifies problems, offers solutions, project updates, etc., to keep the entire staff updated.

Works with campus Facilities to carry out basic maintenance and physical changes required by library operations. Serves as the liaison between the Libraries and a variety of other offices to see that work is to specification and completed within agreed upon times. Coordinates all Library remodel and building projects, working with specific Program Areas and the vendors, whether an outside contractor or UT Arlington’s Facilities.

Negotiates maintenance agreements and service contracts for library equipment, software, and systems. Determines what agreements would be cost effective and monitors performance. Ensures that contracts are renewed and paid each year.

Supervises the Libraries’ Accounting Group with regards to procurement and the timely payment of invoices. Prepares purchase orders, requests for proposals, and is the Libraries’ main liaison with Campus Procurement Services. Closely monitors the Libraries’ M&O budget for all matters. Participates in the budget process by providing background information, previous expenditures, and makes estimates on future spending needs. An authorized signer on all Library accounts.

Professional Memberships
Member of ALA and LAMA
Larry G. Harrison  
1225 West Mitchell Street  
Arlington, Texas 76019  
(817) 272-3458

OBJECTIVE

Filling Director Position for University of Texas Office of Facilities Management where the following skills and experience are being used:

Facilities Management Planning/Organizing  
Facilities Planning/Design Construction  
Analysis/Problem Solving  
Supervision/Administration  
Environment/Safety

QUALIFICATIONS

Forty-three years of increasing experience and responsibility in managing engineering, environmental, and safety organizations involved in maintenance and operation of facilities and utilities systems and directing master planning, design and construction. Financial and executive level management experience that used first-hand dealing with building codes, leases, architect-engineering firms, environmental, safety, and construction contractors.

PROFESSIONAL ACHIEVEMENTS

FACILITIES MANAGEMENT

Responsible for the policy, programs, and execution of managing the physical plant; including construction, renovation, repairs and maintenance of all utilities systems, structures and environmental functions. Developed, defended, and executed the facilities budget in excess of $650 million annually and operated a physical plant valued at over $6 billion. Established facilities requirements for program changes, and developed and executed facilities master plan (15 to 20 year long-range plan). Managed physical plants from 2.5 to 15 million square feet of facilities space.

DESIGN AND CONSTRUCTION

Responsible for construction and capital outlay programs that have ranged from $11 million to over $650 million annually. Established design criteria and standards for facilities, utility systems, energy conservation, fuel storage and fire prevention. Design and construction included one new school that was composed of 29 buildings, including a male and female dormitory. Won several design awards and still maintained an
exceptional construction execution rate.

SUPERVISION

Supervised work of over 350 people composed of professional engineers, craftsmen, planners, firefighters, financial managers, real estate specialists, environmental engineers and coordinators, safety officers, construction inspectors, and administrators.

PROBLEM SOLVING

Interpreted building codes and laws, and set policy for the operation of all facilities. Negotiated fair pro-rata share for lease and facility operations with executive level management of the city and state, resulting in agreements satisfactory to all parties.

CONTRACTING

Knowledge of contracting policy and procedures, especially in the areas of construction and service contracts and material and equipment purchases.

ENVIRONMENTAL/SAFETY

Responsible for environmental and safety policies and guidance. Provided implementation of National Environmental Protection Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act, and various air and water quality acts and directives. Provided for the long-range planning and development of environmental programs. Provided implementation of the Life Safety Code and other related safety directives.

ENERGY CONSERVATION

Working with the state, established one of the best programs where the work accomplished paid for itself in less than five years and provided better working and living facilities.

EDUCATION

BS, Civil Engineering, Old Dominion University, Norfolk, Virginia and National Security Management Course, National Defense University, Washington, D.C.
ANN E. HODGES

3903 Old Place Road ♦ Arlington, Texas 76016 ♦ 817/272-7510 (w) ♦ ann.hodges@uta.edu

 Degrees and Credentials
M.S. in Applied History, University of North Texas, August 1993
M.S. in Library Science, University of North Texas, August 1992
B.A. in History, University of Texas at Austin, December 1978
Certified Archivist, September 1994

 Library Experience
Special Collections Program Coordinator, January 1, 2004-Present
The University of Texas at Arlington Libraries
Interim Coordinator for Special Collections, July 11, 2003-December 31, 2003
The University of Texas at Arlington Libraries
Assistant Coordinator for Special Collections, March 1, 2003-July 11, 2003
The University of Texas at Arlington Libraries
Special Collections Projects Manager, July 1, 2000 - February 28, 2003
The University of Texas at Arlington Libraries
Cataloger for Archives/Manuscript Collections and Maps, June 17, 1996 - June 30, 2000
Special Collections, The University of Texas at Arlington Libraries
Librarian/Archivist, Mexican Archives Project, October 1, 1993 - November 15, 1995
Benson Latin American Collection, Rare Books and Manuscripts
The University of Texas at Austin General Libraries

 Professional Offices and Memberships
Secretary, Texas Heritage Online (2010-)
President, Society of Southwest Archivists (2008-2009)
Steering Committee Chair, Texas Heritage Digitization Initiative (2007-2008)
Vice-President, Society of Southwest Archivists (2007-2008)
Executive Board, Society of Southwest Archivists (2004-2006)
Membership Committee Chair, Society of Southwest Archivists (2001-2004)
Newsletter Editor, Society of American Archivists Description Section (1996-2001)
Academy of Certified Archivists, Society of American Archivists, Society of Southwest Archivists, Metroplex Archivists, Texas State Historical Association, Texas Map Society, American Library Association, Rare Books and Manuscripts Section. Past memberships include the Texas Library Association, Texas Association of Museums, Austin Archivists, and the ALA Maps and Geography Roundtable (MAGERT).

 Honorary Societies
Beta Phi Mu Library Science Honor Society
Phi Kappa Phi Honor Society

 Continuing Education
Focusing on Photographs: Identification And Preservation, Philadelphia, Pennsylvania, September 22-23, 2009 (Conservation Center for Art and Historic Artifacts)
Persistence of Memory: Sustaining Digital Collections, Chicago, Illinois, December 9-10, 2008 (NEDCC)
Evaluating Rare Books and Special Collections, College Station, Texas, February 28, 2008
Appendix 5

Project Management, Chicago, Illinois, August 2007 (SAA; ARL Management Skills Institute, Albany, New York, June 2007
Disaster Recovery: A Hands-On Workshop, Irving, Texas, November 11, 2006
Donor and Libraries, University of Virginia Rare Books School, 2004 (Susan Allen, William P. Barlow, Jr.)
Security in Archival Repositories, Los Angeles, California, August 19, 2003 (SAA)
Advanced Seminar in Special Collections Administration, Rare Books School, July 2003
Encoded Archival Description, Austin, Texas, October 2002 (SAA: Kris Kiesling, Michael Fox)
Archival Perspectives in Digital Preservation, Birmingham, Alabama, August 19-20, 2002 (SAA: Paul Conway)
Metadata Matters: RLG Update on Current Metadata Initiatives, Birmingham, Alabama, August 20, 2002 (SAA)
Texas Grant Writing Workshop, Austin, Texas, July 8-12, 2002 (Texas Historical Commission)
EAD Stylesheets, Fort Worth, June 25-26, 2002 (SAA: Kris Kiesling, Michael Fox)
Leadership and Management of Archival Programs, Washington, D.C., August 2001 (SAA: Bruce Dearstyne)
Introduction to XML workshop, Charlottesville, Virginia, August 2001 (ARL)
Grant Proposal Preparation, Denver, Colorado, August 29, 2000 (SAA: Joyce Ray, Barbara Paulsen)
Encoded Archival Description workshop, University of Virginia Rare Books School, June 2000 (Daniel Pitti)
Digitization for Cultural Heritage Professionals, Houston, Texas, 2000 (HATI)
Voyager Image Server training, Arlington, September 9, 1999
Voyager Reports training, Arlington, September 8, 1999
Digital Imaging Technology, Pittsburgh, August 23, 1999 (SAA)
School for Scanning, Northeast Documentation and Conservation Center, June 2-4, 1999
Introduction to Rare Maps and Atlases, Indiana University, October 4-9, 1998
History of Geography and Cartography (UTA HIST 4301), Spring 1997 (not for credit)
History of Cartography (UTA HIST 5350), Spring 1997 (not for credit)
Archives and Photography Cataloging, Denton, Texas, October 5, 1996 (Online Audio-Visual Catalogers annual conference: Richard Pearce-Moses).
Map Cataloging, Denton, Texas, October 4, 1996 (Online Audio-Visual Catalogers annual conference: Catherine Gerhart and Anke Grey, University of Washington)
Cyberspace for Archivists, Houston, February 3, 1996 (SAA: Leon Miller and Peter Hirtle)
Advanced Online Cataloging with MARC, Internet, ... Austin, June 28, 1995 (UT GSLIS: Joanna Fountain)
Photographic Collections Management, Philadelphia, May 19-20, 1995 (SAA: Richard Pearce-Moses and Laurie Baty)
Putting It All Together: Developing the Small Archives from the Ground Up, Austin, November 16-17, 1994 (UT GSLIS: David Gracy)
APPMM and Archival Cataloging: A Workshop in the Practical Application of Archives, Personal Papers and Manuscripts, Austin, June 2-3, 1994 (SAA: Steven L. Hensen)
Non-Paper Based Collections: Strategies for Preservation, Austin, April 8, 1994 (UT GSLIS: Paul Banks)

Selected Publications
APPENDIX 5

WILLIAM P. LULL
President and Principal Consultant, Garrison/Lull Inc.

Responsibility: Preservation Environment Consultant

Education: BSAD/Building Technology, Department of Architecture, Massachusetts Institute of Technology, 1978.

Positions: Former building systems designer and manager for Syska & Hennessy Engineers (NYC), Dubin-Bloome Engineers (NYC), Tennessee Valley Authority (Knoxville), and James Associates Architects/Engineers (Indianapolis). Adjunct Associate Professor of Building Technology, The Real Estate Institute, New York University.

Affiliations: Member, ASHRAE (voting member TC2.3, TC8.12, SPC145, Chair GPC27P); Associate Member, American Institute for Conservation.


Relevant Experience: In the last 20 years, Mr. Lull has consulted on the new or renovated preservation environments in over 200 museums, libraries and archives, including: the Museum of Modern Art, the Nelson-Atkins Museum, Monticello, the new Mount Vernon Museum, the Harvard Depository, Widener Library; the new or renovated state archives in Alabama, Arizona, Delaware, Georgia, Mississippi, New York, Oregon, South Carolina, Utah; and the Bermuda Archives. Other library archival storage projects include: Bancroft Library (UC Berkeley), The Harvard Depository, The Library of Congress Off-Site Storage, and Baker Library and Harvard Business School.


Passive-conditioned freezer photographic storage projects include the new Rakow Library Freezer Room, and the Alabama Archives large commercial freezers.

Selected Papers/Presentations:

Mr. Lull has also made presentations at many other conservation-related conferences, as well as AIA and ASHRAE conferences, where formal papers were not presented.

Related to other areas of construction, Mr. Lull has also written films for the Federal Highway Administration and MIT, considerable course materials for NYU, and articles for CONSULTING/SPECIFYING ENGINEER, BUILDINGS magazine, and THE JOURNAL OF REAL ESTATE DEVELOPMENT.
Brenda S. McClurkin
P.O. Box 638, Weatherford, Texas 76086 • 817.272.7512 (w) • mcclurkin@uta.edu

Degrees and Credentials
Academy of Certified Archivists, September 2002
Masters in Library Science, University of Arizona, May 1991
Bachelor of Arts in History, Colorado Woman’s College, December 1971

Library Experience
Historical Manuscripts Archivist, October 2002 - Present
Special Collections, The University of Texas at Arlington Library
Archivist (Volunteer), Heritage Gallery, September 2001-June 2002
Weatherford Public Library, Weatherford, Texas
Graduate Intern, Archives and Special Collections, September-December, 2001
Weatherford College, Weatherford, Texas
Archivist (Volunteer), June 1997 - Present
Ball-Eddleman-McFarland House, Historic Fort Worth, Inc., Fort Worth, Texas
Archivist (Volunteer), January 1996 – December 2000
Archives and Special Collections, Weatherford College, Weatherford, Texas
Librarian II (Federal Documents), April 1992 – April 1994
Research Division, Arizona Department of Library, Archives and Public Records, Phoenix, Arizona
Librarian I, Research Division, July 1991 – April 1992
Research Division, Arizona Department of Library, Archives and Public Records, Phoenix, Arizona

Professional Offices and Memberships
Immediate Past President/Executive Board Member, Society of Southwest Archivists (2010-2011)
President, Society of Southwest Archivists (2009-2010)
Vice-President, Society of Southwest Archivists (2008-2009)

Academy of Certified Archivists, Society of American Archivists, Society of Southwest Archivists,
Metroplex Archivists, Texas State Historical Association, Texas Map Society, American Library
Association, Rare Books and Manuscripts Section and ACRL, Texas Library Association, Historic Fort
Worth, Inc. Advisory Board, Doss Heritage & Culture Center (Weatherford, TX) Collections Committee.

Honors and Honorary Societies
Beta Phi Mu Library Science Honor Society
City of Weatherford, Texas: Dedicated Service to the Heritage Gallery Collection, 2002.

Continuing Education
Conservation Center for Art and Historic Artifacts (CCAHA)
Appendix 5


Visual Literacy for Photograph Collections, Austin, August 11, 2009. SAA

A Race Against Time: Preserving our Audiovisual Media, Austin, March 2-3, 2009. CCAHA

Digitizing Analog Audio Resources, Dallas, November 19, 2008. Amigos

Digital Imaging for Photographic Collections, web-based, November 11-14, 2008. Amigos


Digital Directions, Jacksonville, FL, June 10-12, 2008. Solinet and Northeast Documents Conservation Center (NEDCC)


Evaluating Rare Books and Special Collections, College Station, Texas, February 28, 2008.

Caring for Originals during the Scanning Process, (web-based) February 20, 2008. Solinet

Legal Aspects of Photography Rights, Archive Management, and Permissions, Santa Fe, November 28, 2007. SAA

Copyright: The Archivist and the Law, Chicago, August 27-28, 2007. SAA


Introduction to Imaging and Imaging Technology, Waco, TX, May 17, 2007. Amigos

Disaster Recovery: A Hands-On Workshop, Society, Irving, Texas, November 11, 2006. Society of Southwest Archivists (SSA) and Munters Corporation


MARC According to DACS: Archival Cataloging to the New Descriptive Standard, New Orleans, August 15, 2005. SAA

Describing Archives: A Content Standard, New Orleans, August 14, 2005. SAA


Practical Training for Writing Effective Grant Proposals, Austin, June 21-24, 2004. Texas Historical Commission

Building Digital Collections, Medford, Massachusetts, August 2, 2004. SAA


Advanced Techniques for American Genealogical Research, Los Angeles, August 19, 2003. SAA


Encoded Archival Description, Austin, Texas, October 23-25, 2002. SAA


Identification and Care of Photographs, Austin, November 1, 1999. Texas Association of Museums

Selected Publications

Education:
Bachelor of Science, Mechanical Engineering, May 2004
The University of Texas at Austin
NCEES Principals and Practice of Engineering Exam Score: 84/100
Registered Professional Engineer in Texas, #102384
LEED® Accredited Professional

Experience:
8/2008 – Present: Facilities Engineer, University of Texas at Arlington.
Provide ongoing engineering support of a wide breadth of campus projects and initiatives, including design, bid selection, and project management of utility/infrastructure-intensive facilities renovations. Provide Owner-Contractor-Engineer-Architect coordination for 228,000sf, $130M Engineering Research Building project. From concept to completion, initiate and oversee water and energy conservation projects. Provided engineering, plumbing, and mechanical design services for multiple cleanroom installations. Recently authored application for and won $1.8m federally-funded grant for the construction of a 385kW grid-tie photovoltaic (solar) array. Manage design, contractor selection, scheduling, grant funding and reporting, installation, and commissioning of same project. Provided development and ongoing maintenance of campus specifications and design standards.

Contributed as a consulting/design engineer on mechanical, plumbing, and electrical systems. Responsibilities included design, analysis, and trouble-shooting, with increasing levels of responsibility, under the direction of senior, registered professional engineers and project managers. Work was often specialized towards the needs healthcare and IT clients, however project experience was highly diversified. Projects included facilities condition assessments for a 13-hospital system with over 10 million square feet of conditioned space, design of various healthcare projects, including sterile services areas, a commercial kitchen, radiology spaces, operating rooms, medical gas yard storage, emergency generator additions, a new central plant with 11,000 tons total chilled water capacity, 100,000 square feet of hospital administration area including a compounding pharmacy (FDA-accredited ISO class 7 cleanroom), several floors of a university medical research laboratory, an FDA-validated GMP (for cancer trial drug manufacturing) facility, and a surgery services facility including 36 OR’s and support spaces.

01/2005 – 04/2010: President and Founder, Rivalwear LLC.
Managed all aspects of starting and running an online retail business, such as IP research and protection, product production, marketing and advertising, accounting, shipping, inventories, tax preparation, registration with government agencies, contract negotiations, sales, support, website design and integration,
electronic cash flow methods, etc. Rivalwear LLC was profitable within its first fiscal year.

At Hospira, Inc., Authored, planned, executed, and analyzed Performance Qualification (PQ) protocols for massive batch and continuous autoclave sterilizers in the Austin, TX plant, for submission to the FDA for new product manufacturing certification. Organized production teams on a weekly basis to execute sterilizer test runs. Authored and conducted engineering studies to acquire data necessary for safe production and sterilization of intravenous products. Revised solutions mixing vessel cleanability specifications for several products. Fathered an engineering initiative to utilize heat pumps for steam and heat reclamation, to save over $2 million annually on utilities costs after an expected payback of 2 – 5 years. Routinely interacted with all plant areas to fulfill PQ project needs.

First employee in start-up engineering design company. Provided instrumental contributions towards development of first product, a wireless XM satellite radio, packaged in the rear-view mirror assembly for the Harley Davidson aftermarket. Resourced and designed highly varying components, such as etched convex automotive mirror, high-fidelity Bluetooth wireless audio RF components, lithium battery components, point of load printed circuit boards, digital volume control and amplification circuitry, innovative integral rotating clamp assembly for mirror adjustment, and several other mechanical and electronic assemblies. Worked with several CEO’s, vendors, and other representatives towards designing and implementing hardware and technology solutions. Outsourced contractors for end-user documentation layout, point of sale, circuit design, and web development. Consulted with numerous representatives from varying manufacturing and design entities, as well as key contacts in the XM Radio community.

Wrote scripts in Korn Shell, C++, and Perl. Managed, installed, and configured systems using AIX, SuSE Linux and Windows. Aided in software development for the Web System Management GUI within AIX. Compiled build CDs, created new test cases, updated existing test cases, wrote and maintained testing automation scripts, defect troubleshooting, functionality verification testing, and language verification testing of Web System Management for AIX releases 4.3.3, 5.0, 5.1, 5.2, and 5.3. Verified compatibility of Web System Management under all supported operating systems, including Linux, AIX, and Windows. Tested early versions of the Hardware Management Console, which supports the revolutionary Regatta mainframe.
SUMMARY

Over 30 years working in higher education environments, including five years in university libraries, ten years in college textbook publishing, and earlier as a university research assistant.

- Library, database, and internet research
- Production coordination
- Service desk reference contact
- Text editing, proofreading, writing
- Photograph research and scanning
- Use of design/photo editing software
- Computer applications trainer
- Supervising student employees

PROFESSIONAL EXPERIENCE

THE UNIVERSITY OF TEXAS AT ARLINGTON – Arlington, Texas

Library Assistant IV – Libraries, Special Collections August 2007 – Present

- Provides photograph research and manages requests for digital scans of photographs and visual media from collections that comprise approximately 4 million images. Supervises student assistants.
- Covers the Service Desk, as assigned, to provide patron reference assistance.
- Compiles monthly statistical reports on photograph research activities.

UNIVERSITY OF NORTH TEXAS HEALTH SCIENCE CENTER – Fort Worth, Texas

Senior Administrative Assistant June 2006 – August 2007

- Provided administrative assistance to seven faculty members in the Social and Behavioral Sciences department of the School of Public Health.
- Personal assistant, researcher, proofreader, and editor for department chair.

THE UNIVERSITY OF TEXAS AT ARLINGTON – Arlington, Texas

Public Services Librarian – Libraries, Special Collections August 2004 – June 2006

- Oversaw operations of the Special Collections service desk.
- Provided patron reference assistance and class instruction.
- Served on library committees, including the Web Advisory Committee.
- Hired, trained, and supervised student assistants.

Library Assistant II – Libraries, Special Collections January 2003 – August 2004

- Covered the Service Desk, as assigned, to provide patron reference assistance.
- Compiled monthly reports on department statistics.
- Worked with the department’s cataloger to accession newly received items and to import bibliographic and authority records from OCLC into the Online Catalog.
- Handled duties as assigned including binding periodicals, stacks management, text purchases, donor requests.
- Served as back-up to the photograph assistant; handled research and purchase requests for photograph and graphic prints, creating digital scans when requested.

UNIVERSITY OF NORTH TEXAS – Denton, Texas

Graduate Library Assistant November 2001 – August 2002

Graduate Library Assistant in UNT Libraries’ Government Documents Department while finishing a Master’s degree in Library and Information Sciences. Graduated August 2002.

- Copy cataloging for monographs and government documents.
- Wrote training manual for novice copy catalogers in UNT Libraries’ Cataloging Unit.

HARCOURT COLLEGE PUBLISHERS – Fort Worth, Texas October 1991 – October 2001
APPENDIX 5

Developed designs and typeset original customized college textbooks and supporting materials; proofread work for accuracy; managed inventory stock transfers to print vendors.
- Created PowerPoint presentation to promote the Electronic Publishing Department.
- Contributed significantly to Harcourt’s “Author Guidelines for Text Preparation.”
- Helped to establish and maintain an archive of textbook electronic files.

Associate Project Editor 1991 – 1993
Assisted in editorial production of textbooks from manuscript stage through bound book stage, including extensive proofreading tasks and working within constant constraint of deadlines.
- Trained employees to use the Apple computer operating system and MS Word software.
- Created proofreading checklists to standardize proofreading of galley and final page proof.
- Developed, wrote, and taught “QuarkXPress Step-by-Step” sessions for employee groups.

EDUCATION
Master of Library Science – Library and Information Science
University of North Texas, 2002

Master of Arts – Graduate Humanities
University of Texas at Arlington, 1990

Bachelor of Arts – History, Business Administration
University of Texas at Arlington, 1983

MEMBERSHIPS
- Society of Southwest Archivists

VOLUNTEER WORK
- National Archives and Records Administration (2002)
  - Arlington Public Library (1999)
  - Rotary Club (1989-1992)

TRAINING RELATED TO PHOTOGRAPH COLLECTIONS
- Caring for Originals during Scanning Projects (SOLINET 2008)
- Stewardship of Digital Assets (Amigos 2008)
- Preserving Photographs in a Digital World (George Eastman House and Rochester Institute of Technology 2008)
- Digital Imaging for Photographic Collections (Amigos 2008)
- Digital Imaging of Photograph Collections (Amigos 2009)
- Understanding Digital Scanner & Camera Imaging Performance (SAA 2009)
- Visual Literacy for Photograph Collections (SAA 2009)
- Preservation 101 – The New Online Preservation Course (NEDCC 2009)
- Copyright: The Archivist and the Law (SAA 2009)
- Archivists’ Guide to Balancing Legal issues in Photo Collections (SAA 2009)


Let **letters of commitment**

Donald R. Bobbitt, UT Arlington Provost and Vice President for Academic Affairs

Larry G. Harrison, Director - UT Arlington Office of Facilities Management

Sarah S. Wagner, LLC

Garrison/Lull Inc.

Scientific Climate Systems
MEMORANDUM

TO: Gerald Saxon
    Dean of the Library

FROM: Donald R. Bobbitt
      Provost and Vice President for Academic Affairs

SUBJECT: NEH Cold Storage Grant Proposal

DATE: November 22, 2010

This memo is to confirm that The University of Texas at Arlington Office of the Provost and the Office of Research have agreed to waive the indirect costs of the NEH cold storage grant (49.5%) so that these dollars can be used to construct the cold storage facility in the Central Library. In addition, the University will commit $164,111 toward the cost of the facility if the proposal is funded by the NEH.

This project is an essential one for the University since the Special Collections department of the University Library holds more than four million photographs and negatives in various stages of deterioration. These unique historical resources are vital to scholars and the general public to understanding the rich history and heritage of Texas from the late 19th through the late 20th centuries.

Please let me know if you have questions.
November 18, 2010

Ms. Ann E. Hodges
Special Collections Program Coordinator
UT Arlington Library
Box 19497
Arlington, TX 76019-0497

Dear Ann:

This correspondence is addressed to you in your capacity as Project Director for the proposed project to construct a cold storage vault for the preservation of photographic negatives and other audio-visual materials in the collections of the University of Texas at Arlington Library’s Special Collections. It serves to state the commitment of the UT Arlington Office of Facilities Management (OFM) to further participation in this effort. As you know, OFM has taken part in the Library’s strategic planning activities by participating in an all-day meeting on April 16, 2010, with two consultants hired by the Library, other technical experts, and Library staff. During these discussions, OFM provided expertise bearing upon the suitability of proposed vault locations, the technical aspects of converting the space into a cold storage vault and associated mechanical room, and the operations of the proposed vault. OFM also assisted the Library by providing technical information and cost estimates for the proposal to the National Endowment for the Humanities for funding to aid in the construction of the vault.

OFM will help to assure continuity in project planning and execution by assisting the Library in future planning and, should funding be secured, by representing the university in interactions with contractors during vault construction. We will support the Library funded construction, operation, and maintenance of the vault, and commit to the long-term effort to assure the sustainability of the vault and the safety of the Library’s collections by providing dedicated personnel to monitor and maintain the vault.

Please be assured of our best wishes for your success in obtaining funding for the vault project, and of our ongoing support of and commitment to the project.

Sincerely,

[Signature]

OFM Director
Sarah S. Wagner, LLC 
7808 Boston Avenue, Silver Spring, MD 20910-4901 
Tel. 301-758-9997 
Email: sarahwagner@att.net 

October 17, 2010 

Ann Hodges 
Special Collections Program Coordinator 
University of Texas at Arlington Library 
Arlington, Texas 76019-0497 

Dear Ann, 

I am quite interested in continuing to assist the UTA Library with planning, development and implementation of cold storage required for the preservation of the photographic archives. I understand that this project will proceed pending funding by NEH and other sources. 

My usual fee for consultation is $150/hour ($1200/day). As we discussed, you might require consultation via email and telephone, regarding the plans and specifications, and periodic site visits during construction phases and the move of collections into the vault. This work would amount to 4-8 hours per month (on average) depending on the project phase, or 24 days total over the course of the 2-year project, including travel days for on-site consultations. The charge for all 24 days would amount to $28,800, not including travel expenses. Based on my 2-day site visit in April, I would expect each similar trip to cost $750. I would anticipate 2-3 brief trips or $2,250 for travel expenses. 

Enclosed, please find my resume. I look forward to hearing from you, and hope your grant application and fundraising for this very important project to preserve these collections are successful. 

Sincerely, 

[Signature] 
SARAH S. WAGNER 
Photograph Conservator and Principal
18 October 2010

Ms. Ann E. Hodges, Special Collections Program Coordinator
The University of Texas at Arlington Library
Arlington, TX 76019

Re: Letter of Commitment for Vault Project

Dear Ann:

This is to serve as a letter stating our commitment to provide further services for the final design and implementation phases of your cold storage vault project. This commitment is based on our minimum involvement in providing the following activities as noted in my letter of 14 October 2010:

- Project Discussion Meeting
- Evaluation and Comments on Design Engineer’s Work
- Evaluation and Comments on Vendor Design Submittal
- Construction Observations
- Acceptance/Punch List Observations

I hope to have the opportunity to help you see this project to a satisfactory completion.

Sincerely,

GARRISON/LULL INC.

(signed)
William P. Lull, President
14 October 2010

Ms. Ann E. Hodges, Special Collections Program Coordinator
The University of Texas at Arlington Library
Arlington, TX 76019

Re: Quote for Further Garrison/Lull Services for Film Vault Project

Dear Ann:

We will be glad to provide various assistance in helping you secure funding, as we have
done to date, for no additional fee or expenses. After you secure funding for the vault
project, if you so desire, our continued involvement would be as follows, under the same
terms of our previous proposal:

PROJECT DISCUSSION MEETING. This would be a site meeting to discuss project scope
and funding, and revisit project issues and design as necessary. Fee: $2,900.

EVALUATION AND COMMENTS ON DESIGN ENGINEER’S WORK. (Report "Suggested Further Work"
item (5.)). Garrison/Lull would evaluate and comment on the performance
specification of the vault for coordination with the goals and guidelines in our
report. Fee: $2,000.

EVALUATION AND COMMENTS ON VENDOR DESIGN SUBMITTAL. (Report "Suggested Further Work"
item (8.)). After the selected vendor prepares a detailed design for the
vault, Garrison/Lull will assist the design engineer by evaluating and commenting on
the vendor design submittals for coordination with the goals and guidelines in the
our report and the conclusions from the Project Discussion meeting. This would be
followed by a site meeting with the vendor and the design engineer to finalize their
design. Fee: $3,900.

CONSTRUCTION OBSERVATIONS. (Report "Suggested Further Work" item (9.)). Site visit
and meeting to observe and discuss the installation. This should be when most of
the equipment has arrived, but is not yet in operation. Also includes comments on
any additional contractor submittals. Fee: $3,900.

ACCEPTANCE/PUNCH LIST OBSERVATIONS. (Report "Suggested Further Work" item (10.).)
Garrison/Lull will make a site visit to evaluate the construction before final
acceptance. Fee: $3,900.

OCCUPANCY/USER'S GUIDE. (Report "Suggested Further Work" item (11.).) Garrison/Lull
will prepare a "User's Guide" to help the Special Collections staff and the campus
facilities people know how to use and monitor the vault for the best performance
and reliability. This will require three (3) site visits, one after completion of the

The total fee would be $23,400, and would include all expenses. The final User’s Guide
service would be optional, and something we could do later. Leaving that off, our fee
for the basic services would be $12,700.

Please let me know if you need a formal proposal for these services, or need anything
further from us.

Sincerely,

GARRISON/LULL INC.

(signed)
William F. Lull, President

GARRISON/LULL INC.
October 18, 2010

Ann E. Hodges
Special Collections Program Coordinator
University of Texas at Arlington Library
Box 19497
Arlington, TX 76019-0497

Dear Ann,
This letter is to confirm Scientific Climate Systems’ intent to participate in the construction of the archival vaults at the University of Texas –Arlington were we to become the successful bidder on this project.

We hope that you are able to secure funding for this important project and look forward to the opportunity to work with you.

Best regards,

Jeff Mitchell
Sr. Sales Engineer
Scientific Climate Systems, Ltd.
8208 Westpark Dr.
Houston, TX 77063
Letters of Support

James Reilly and Douglas Nishimura, Image Permanence Institute
Ron Tyler, Amon Carter Museum
Jan Jones, Author and Historian
Hollace Weiner, Archivist and Journalist
IMAGE PERMANENCE INSTITUTE
Rochester Institute of Technology
Frank E. Gannett Memorial Building
70 Lomb Memorial Drive, Room 7B-2000
Rochester, NY 14623-5604
Phone: (585) 475-5199
Fax: (585) 475-7230

November 24, 2010

To the National Endowment for the Humanities Reviewers, we are writing in support of the cold storage grant request submitted by the University of Texas at Arlington.

While we are not qualified to comment on the value of the negative collection, given the results of the condition surveys and their current storage environment, we can say that the future of these negatives is dire. IPI’s research has shown that the only course of action to save these negatives is cold storage. Based on the quantity of negatives in this collection in need of cold storage, freezers do not appear to be a very cost effective option and a cold storage vault is required.

Accelerated testing on acetate film support beyond an A-D Strip value of about 2 doesn’t work very well due to poor behavior of the reaction, however, 10 years of real-world testing has clearly shown the benefit of cold storage for film already in a serious state of deterioration (Bigourdan, J., “Stability of Acetate Film Base: Accelerated-Aging Data Revisited,” in Final Program and Proceedings, Archiving 2005, April 26-29, 2005, Washington, D.C. Springfield: Society for Imaging Science and Technology, 2005.) The 15-year data has not been published yet, but it reinforces the conclusion that cold storage is of great benefit for the preservation of seriously deteriorated acetate films.

For film in severely degraded condition, a lower temperature storage environment would be preferred for preservation reasons, but given the patterns of use for this collection, the decision to work at a higher temperature and low relative humidity is an excellent choice.

The interim vault is not required in order to safely move material in and out of the cold storage vault, but it was a good addition to include. For one thing, physical law says that the rate of heat exchange is proportional to the temperature difference so the intermediate vault reduces the loss of cold air to the outside environment during movement of material in and out of the cold storage vault and that makes the cold vault run more efficiently. Secondly, the interim vault condition of 55°F and 35% RH has a dew point temperature of 28.3°F. If, for any reason, material in the cold vault can’t be removed inside vapor-proof packaging, it can be safely taken into the interim vault to warm-up before being removed to the outside office environment. It isn’t the most time-efficient way to access material, but it’s an option if packaging in a vapor-proof bag isn’t possible. A flattened panorama negative, for example, might require the use of the interim vault as a staging room.
In summary, the case made for the need for cold storage is technically sound, the plan has been well researched and the vault scheme with supplemental freezers is also technically sound and well thought out. We whole-heartedly endorse this grant proposal.

Sincerely,

[Signature]

James M. Reilly  
Director

And

[Signature]

Douglas W. Nishimura  
Research Scientist
November 23, 2010

To the National Endowment for the Humanities Reviewers:

I am writing to express my support for the University of Texas at Arlington Library Special Collections’ application for a two-year Sustaining Cultural Heritage Collections program implementation grant to aid in the construction of a cold storage vault to preserve its vast collection of photographic negatives.

Since the mid-1980s, UT Arlington Special Collections has emerged as the major repository for photographic images in North Texas and one of the largest in the state, with collections exceeding 5 million negatives and 200,000 prints. These materials document not only the rich and vibrant history of Fort Worth and Dallas, but the dynamic growth that thrust the Dallas-Fort Worth area into national prominence in business, politics, the arts and sports. These irreplaceable assets continue to be heavily tapped to illustrate a myriad of books and other print publications, television programming, websites, exhibitions, and educational uses.

My support for this proposal stems from my concern for the preservation of these unique visual documents as well as my use of the collection throughout my career as historian, author, historical administrator, and museum curator and director. The largest component of this collection is the morgue of *Fort Worth Star-Telegram*, long the city's major daily newspaper. The paper at one time had a circulation area approximating 350,000 square miles and served not only Fort Worth, but West Texas, New Mexico and Western Oklahoma. From the mid-1920s to the mid-1950s, the *Star-Telegram* had the largest circulation of any newspaper in the state. The paper garnered two Pulitzer Prizes, in 1981 and 1986. In addition to illustrating the day-to-day news of Fort Worth, a business, financial and cultural center with strong historical roots in cattle, petroleum and railroads, the newspaper offered coverage of national and international import.

The *Star-Telegram* materials also record the personal and public life of its publisher, Amon G. Carter, an entrepreneur and philanthropist whose acclaimed assemblage of art of the American West forms the nucleus of this museum. In addition to the newspaper, Carter’s business interests included the founding of the first radio station in Fort Worth and the first television station in Texas, petroleum exploration and production, and ownership interests in what is now American Airlines. He played a role in bringing the first mail plane to Fort Worth in 1911 and establishing three World War I flying fields in the area. He also served as the first chairman of the board of directors of Texas Technical College in Lubbock. He coined the iconic phrase “Where the West Begins,” a motto that
identifies the character of Fort Worth and still appears on the masthead of the Star-
Telegram. Carter entertained U.S. presidents, national celebrities and businessmen at his
nearby Shady Oak Farm. Carter’s communications, aviation, and other business pursuits;
entertainment of notable guests; philanthropic interests; and civic boosterism are all
represented in the UT Arlington collection.

Other UT Arlington photographic holdings include the W. D. Smith Commercial
Photography Negatives (Fort Worth), Squire Haskins, Inc. Photography (Dallas), Jack
White Photograph Collection, Basil Clemons Photograph Collection, various UT
Arlington photograph collections, the Arlington Citizen-Journal Collection and
more. Each of these collections offers a unique focus and specialty of worth to a variety
of researchers in the humanities. In addition, the Amon Carter Museum of American Art
has entrusted Special Collections with several photographic collections of Fort Worth
historical interest including the Zoe Davis and Howard McPeak Collections.

The Amon Carter Museum of American Art houses a major fine art photography
collection. As part of a 2001 expansion, the Museum constructed state-of-the-art cool
and cold storage vaults to provide proper environmental conditions to ensure the long-
term preservation of our collection of photographic negatives, slides, and color prints.
Members of the UT Arlington Special Collections staff have toured our cool/cold storage
vaults on two occasions; sought the advice of John Rohrbach, Senior Curator of
Photography and Sylvie Pénichon, Conservator of Photographs; and have engaged our
consultant, William Luil of Garrison/Luil, to assist in the planning of the UT Arlington
facility.

The need is immediate. Special Collections staff has documented degradation in their
1930s and 1940s film negatives, a condition that is starting to creep into the 1950s
vintage film as well. Without this cold storage intervention, the negatives will soon be
unusable. This cold storage initiative demonstrates UT Arlington’s continued concern
over the welfare of the collections for which they have responsibility. I urge the National
Endowment of the Humanities to fund this grant application in order that these unique
images will continue to be available to future generations of scholars and researchers.

Sincerely yours,

[Signature]

Ren Tyler, Ph.D.
Director
Jan L. Jones  
8012 Sunscape Ln.  
Fort Worth, Texas 76123  
19 November 2010

To the National Endowment for the Humanities Reviewers:

I first became aware of the scope and historical significance of the University of Texas at Arlington Library’s photographic and negative collections in the mid-1990s, shortly after Special Collections acquired the Fort Worth Star-Telegram’s vast photo and negative archives. Acquisition of the Star-Telegram Collection added considerable weight to the University’s already significant negative and cartographic collections. Since that acquisition, the University has continued to acquire collections especially notable for their historical relevance.

Three other collections that I have come to know through the span of my work as a historical writer and researcher are the W. D. Smith Commercial Photography Collection, containing thousands of negatives of area buildings and architecture, many of these long gone; the Jack White Collection, which contains both commercial negatives and historically significant, one-of-a-kind photos of vanished places and architecture collected by Mr. White over a long and distinguished career; and the Flora and Dickson Reeder Collection, a unique record of one of the most important children’s theater groups in the U. S. from the 1940s through the 1960s. I have researched in all these archives and found them indispensable to the completion of three books covering various aspects of the arts and politics in Texas. As I continue work now on a fourth volume, I know I will be at UT Arlington again, since its collections are so rich in historical depth and detail.

The Star-Telegram archive has been especially meaningful to my work. Even before UT Arlington acquired it, the archive stood out in its historical importance in North Texas as a surviving journalistic negative and photograph collection. Other major newspapers in both Dallas and Fort Worth had ceased publication and their photographic archives, if they existed at all, had either been lost altogether or dispersed into the hands of private collectors. Only the Star-Telegram’s collection of negatives detailing eight decades of Texas history had survived largely intact.

At the time I began exploring the collection, I was completing work on a volume chronicling Fort Worth’s contribution to the 1936 Texas Centennial celebration. The Star-Telegram collection contained the only surviving photographic records of this event, which remains significant for a number of reasons. The Frontier Centennial as it came to be called, marked a watershed moment not only in Fort Worth’s recovery from the extended effects of the Great Depression,
APPENDIX 7

but also in the career of rising Broadway producer, Billy Rose. Rose’s building of Casa Mañana Theater and his staging of its centerpiece production, the Casa Mañana Revue, marked the first time that a New York-based production team had fully written, produced, and staged a Broadway-caliber musical revue outside of New York. Rose’s innovative production of this revue employing a crack team of imported designers, directors, technicians, and choreographers and a second show, Jumbo, exported to Fort Worth direct from Broadway and re-staged, brought national media attention to the city and to Rose. Every detail of planning, construction, and rehearsal for the event and its subsequent four month run, was chronicled by Star-Telegram photographers and reporters. The end result, a national headline-grabbing event in its day, excited a great deal of interest both in Texas and across the country, considerably advancing and changing the direction of Rose’s later career. He went on to become a major force in the New York entertainment industry.

Photographic documentation of Billy Rose, his professional associates, the Casa Mañana Revue and its appendant shows would simply not have been possible without the Star-Telegram negatives. Even the Billy Rose Theater Collection of the New York Public Library-Lincoln Center retains few quality images of this period in Rose’s career.

The Star-Telegram’s and other negative collections’ steadily deteriorating condition from the effects of heat and humidity has created both a crisis of epic proportions and a dilemma for UT Arlington. At the same time the University is struggling against such ravages, one tool in the efforts to conserve these fragile records until some better technology arises would be a proper cold storage vault. Unfortunately, a facility of this sort requires funding the University’s budget at this already critical moment cannot support. It raises the very real possibility that without outside grants or gifts, the five million negatives now housed in the University’s permanent collections under less than ideal conditions will be degraded beyond preservation. These priceless images of events in the 20th century will be lost forever.

As we enter an era where the most common media forms of the 20th century—newspapers, magazines, photographs, negatives—are vanishing at an accelerated, even astonishing rate, I ask the National Endowment for the Humanities Reviewers to give careful consideration to this request and provide UT Arlington with the funds needed to preserve these fragile imprints of our national legacy. They simply must not be lost.

Regards,

[Signature]

Jan L. Jones
To National Endowment for the Humanities Reviewers:

As the author of six books and an archivist who has organized three specialized, private collections, I can attest to the value and scope of the photographic collection at the University of Texas at Arlington Library.

For example, when I presented a paper on sports superstar and Olympic gold medalist Babe Didrikson Zaharias to the Southwestern Historical Society, most of the photos in the PowerPoint presentation came directly from the archives at UT Arlington.

When I wrote a profile of Wilmer Allison, Jr., a tennis star and Davis Cup player from the 1930s, I found rare photos in the UT Arlington files.

Two other forgotten Texas athletes – amateur golfers Polly Ann Riley and Aniea Goldthwaite, who played on the U.S. Curtis Cup Teams of the ‘30s, ‘40s, and ‘50s – have been largely omitted from recent golf-history books. In my quest to revive their records and their legacies, the photo collection housed at the University of Texas at Arlington was invaluable. As a result of my research, the Fort Worth Museum of Science and History plans to feature these two golfers in an upcoming pictorial exhibit about Texas sports heroes.

Another of my quests has been to document Jewish communities across Texas. Initially, the archivists at UT Arlington doubted that they had much on this topic in their collections. However, I found a wealth of photographs in the Fort Worth Star-Telegram Photograph Collection, the W.D. Smith Photograph Collection, and the Basil Clemons Photograph Collection. The black-and-white pictures I found are not filed under a “Jewish” heading, but rather by surnames, institutions, community activities, businesses, and charitable organizations. Copies of these photos and documents formed the basis of numerous exhibits produced by the Fort Worth Jewish Archives and the Texas Jewish Historical Society as well as papers published in Southern Jewish History, the journal of the Southern Jewish Historical Society; American Jewish History, the journal of the American Jewish Historical Society; the Southwestern Historical Quarterly; and an anthology published by Brandeis University Press.

TEXAS JEWISH HISTORICAL SOCIETY
P.O. Box 10193
Austin, Texas 78760-0193
The photograph collections at the University of Texas at Arlington have national scope and importance. I have made frequent and heavy use of the collections. As such, I strongly urge that this institution receive a Sustaining Cultural Heritage Collections program grant toward construction of a cold storage vault in the University of Texas at Arlington Library to stabilize and preserve its photographic negatives.

Regards,

Hollace Ava Weiner, Archivist
Fort Worth Jewish Archives
River Crest Country Club Archives
Beth-El Congregation Archives
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