

Elkmont Historic District

Great Smoky Mountains National Park

Gatlinburg, Tennessee

National Park Service
U.S. Department of the Interior
Cultural Resources, Partnership and Science Division
Southeast Region



Finishes Analysis Report

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Prepared For
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Prepared By
Building Conservation Associates, Inc.
242 Cherry Street
Philadelphia, PA 19106

BCA Team
Dorothy S. Krotzer
Marlene Goeke

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1.0 Introduction

At the request of Keyes Williamson of The Jaeger Company, Building Conservation Associates, Inc. (BCA) has prepared a finishes analysis of cabins in the Elkmont Historic District. Now part of the Great Smoky Mountains National Park, the cabins are owned and operated by the National Park Service (NPS). The primary goal of the analysis is to identify the general chronology of finishes on the exterior of select cabins, with an emphasis on the front elevation of each cabin, to guide future restoration work.

The following report summarizes the findings of the finishes study and presents the general chronology of paint layers for each finish sample removed from the site. (See attached Appendices A and B). Following the introductory information regarding the site and the study methodology, the report discusses the findings of the research and makes recommendations for appropriate restoration paint colors.

All mounted cross-sections have been returned to the Great Smoky Mountains National Park to be added to the Great Smoky Mountains Museum Collection. All work required for the execution of this study was performed by Dorothy S. Krotzer, BCA Regional Director, and Marlene Goeke, BCA Staff Conservator with assistance from Catherine Matsen, Associate Scientist at Winterthur Museum, Garden and Library, for the instrumental analysis. The site visit was performed and samples were taken in October 2015, and laboratory examination was performed November 2015 through February 2016.

2.0 Background Information



Figure 1: Cabins in Daisy Town

2.1 Overview of Site History¹

The Elkmont Historic District consists of a collection of structures within Great Smoky Mountains National Park (fig. 1). The structures, mainly cabins but also including a clubhouse, one hotel, and several outbuildings, were added to the National Register of Historic Places in 1994. Most of the cabins date to the early 20th century, and were built by prominent Knoxville families as rustic summer retreats. When the Great Smoky Mountains National Park was established in 1934, the owners of the cabins were given lifetime leases in return for the sale of their properties, which were transferred to the federal government. The owners relinquished their lifetime leases for fixed 20-year leases in exchange for commercial electric service in 1952, and obtained an extension on those leases in 1972. The families continued to use the cabins throughout the 20th century, with the last lease expiring in 2001. All of the cabins are now under NPS ownership.

The NPS's 1982 General Management Plan called for demolition of all of the Elkmont structures so that the area could be returned to its natural state. Since the cabins were to be demolished, the NPS was initially not concerned with maintenance of the structures. However, there was public interest in the preservation of the buildings, which resulted in the National Register nomination and subsequent listing in 1994. Since the structures were listed on the National Register, the demolition of the structures was determined by the Tennessee SHPO to be an adverse effect. In 2008, the NPS reached an agreement to retain nineteen structures - eighteen of the contributing buildings within the district and one non-contributing building - and restore sixteen buildings in Daisy Town. The agreement also included preparation of Historic Structure Reports (HSR) for each historic building being retained. HSRs have been completed or are in process for all of the cabins included in the current analysis. For this project, BCA was provided with the HSRs that have been prepared to date as well as draft versions of the HSRs in progress.

¹ The information in this section is drawn largely from the Historic Structure Reports by Joseph K. Oppermann-Architect, P.A. and The Jaeger Company.

Relevant history of the individual cabins will be discussed in Section 4.0; however, some general observations can be made about the history of the cabins and the potential impact on the ability to document their paint finishes:

- *Limited Information about Alterations.* While the cabins were under NPS ownership fairly early in their existence, the individual leaseholders were responsible for maintenance and upkeep of the cabins. Most, if not all, cabins have had a number of known alterations, additions, and repairs performed throughout their history. Any additions or alterations to the cabins were performed by lease-holders, and limited information is available about those types of changes. Therefore, the cabins as they appear today do not represent their original appearance, and their evolutions may not be fully understood.
- *Limited Historical Photographs.* There are only a few historic photos of the cabins available. There are black and white photographs associated with the 1994 National Register nomination, but the photographs are not high quality. The HABS photos are from 2001, after the families have left the cabins, and are high resolution. They are in black and white so they do not provide much evidence in terms of color; however, some comparisons can be made to the cabins as they appear today to determine if colors have shifted in the last fifteen years. Because of the general lack of archival evidence, it is not possible to relate the paint layers recorded through this analysis to any specific point in time using historic images.
- *NPS-era Maintenance.* In the early 2000s, the NPS, realizing that some of these structures would be retained, performed some limited repairs on the cabins. Most of the repairs involved rebuilding of or removal of deteriorated elements. According to the documentation in the HSRs and Dianne Flaugh (Cultural Resource Program Manager, Great Smoky Mountains National Park), none of the cabin included in the current analysis were painted by the NPS. In addition, elements of individual buildings known to have been replaced by the NPS remain unpainted.

- *Possible Craftsman Influence on Original Aesthetics.* In the 1994 National Register nomination form, many of the cabins are described as Craftsman or Craftsman influenced designs, which “carried out a theme of harmony with nature through the use of natural readily available materials in construction.” It also ascertained that “the rustic nature of the cabins was accented through the use of exposed wood ceilings, wood walls, and floors” and that “natural materials including fieldstone piers and cobblestone in chimneys and fireplaces as well as wood exterior walls tended to blend with the site and in most cases required little maintenance.” This may suggest that the exterior woodwork was either unpainted or finished with a stain or clear coating that would allow the wood of the cabins to be seen.

2.2 Goals of the Finishes Study

The focus of this finishes analysis is on fifteen of the cabins located in the Elkmont Historic District that will be restored, including fourteen cabins in Daisy Town and the Chapman-Byers cabin, located down Jakes Creek Road in Society Hill. While the period of significance for the cabins was identified as 1908-1940 on the National Register Nomination form, the cabins have complex histories that spans into the late 20th century. The NPS has indicated that the continuum of use of the cabins will likely be interpreted, not just the period of significance.

In addition, given that there have been many changes to the cabins over the years, the cabins as they appear today do not reflect the appearance of the cabins during the period of significance. Therefore, for the cabins in Daisy Town, the NPS has directed BCA to make recommendations for restoration paint colors based on the appearance of the cabins when the leases ended for the cabins and, therefore, when the cabins were last occupied. Focusing on this point in time will allow the NPS to tell the entire story of the cabins, while also honestly depicting the cabins as they appear today.

One exception is the Chapman-Byers Cabin (Cabin 38), located remotely from the collection of cabins in Daisy Town (fig. 2). This cabin will



Figure 2: Chapman-Byers Cabin.

likely be interpreted somewhat differently than the other cabins, as it is being retained mainly for its connection to Colonel David Chapman, who was involved in creating the Great Smoky Mountain National Park. The period of interpretation for this cabin will likely be the 1930s.

3.0 Methodology

Before the site visit, BCA reviewed archival documentation about the cabins and the historic district provided by the NPS and The Jaeger Company. Historic Structure Reports (HSR) prepared by Joseph K. Oppermann – Architect, P.A. were available for nine of the fifteen cabins included in the scope of work. Draft HSRs of five of the cabins prepared by The Jaeger Company were also available and reviewed as part of this finishes analysis. These HSRs provided some background information about the cabins, including known alterations or additions, duration of occupancy, and historic images. Also reviewed were several earlier reports as well as HABS photographs taken in 2001, all provided by the NPS or The Jaeger Company. These archival resources helped identify sampling locations in the field and provided context for the analysis and interpretation of the samples.

At the request of the NPS, the following cabins were investigated:

Sneed (Cabin 1)
 Smith (Cabin 2)
 Higdon (Cabin 3)
 Addicks (Cabin 5)
 Creekmore (Cabin 6)
 Mayo (Cabin 7)
 Levi Trentham Log Cabin (Cabin 7A)
 Mayo Servants' Quarters (Cabin 7B)
 Cain (Cabin 8)
 Galyon (Cabin 9)
 Baumann (Cabin 10)
 Scruggs-Briscoe (Cabin 11)
 Cook (Cabin 13)
 Hale (Cabin 15)
 Chapman-Byers (Cabin 38)

All of the cabins are located in Daisy Town, in close proximity to the Appalachian Clubhouse. The exception is Cabin 38 (Chapman-Byers), which is located south of Daisy Town in Society Hill.

Due to budgetary constraints, the total number of samples included in this project was limited. Because of this limitation, the NPS directed BCA to focus the sampling on the front elevation of each cabin, as the fronts typically include the greatest extent of original material. Generally, the front elevations also provided the best location for samples from protected locations, as most cabins have front porches. Samples were removed from a variety of elements on each building, including siding, windows, doors and porches. All of the samples were removed from wood elements.

BCA removed a total of 82 finish samples from the site. A full sample list is included in Appendix A. Samples were removed using an Exacto® style knife and placed in bags labeled with their location. The samples were then taken back to the conservation laboratory and examined under a stereomicroscope to identify those with the most paint evidence. Select samples were then embedded in a commercial polyester/methacrylate resin polymerized with a methyl ethyl ketone peroxide catalyst (Bioplast®). Embedded samples were sectioned on a Leco® VC-50 micro-saw for microscopic examination. The sectioned samples were dry-polished using a series of fine Micromesh® polishing cloths ranging from 6,000 to 12,000 grit. Sectioned samples were observed under a Nikon 50i compound microscope in both visible light filtered through a daylight correction filter and ultraviolet light. The ultraviolet light was generated by a mercury illumination system filtered through a violet filter cube (EF4 V-2A Ex400/40 Dm 430 Bar 450). Photomicrographs of representative samples were taken using a five megapixel Nikon DigiSight color digital camera system and are included in this report to illustrate

specific observations. All sample stratigraphies and photomicrographs are also included in Appendix B.

Instrumental analysis was used in combination with cross-section analysis to document the composition of the finishes found on the cabins. BCA worked with Catherine Matsen, Associate Scientist at Winterthur Museum, Garden and Library, to perform instrumental analysis on several samples. Analysis included: 1) analysis of two paint layers on different buildings to determine if the paints are the same; 2) comparison of an original element with a known replacement element to compare the paints and 3) analysis of the weathered surface of the wood to determine if a clear finish is found underneath the existing paint layers.

4.0 Summary of Observations

4.1 General Observations

Several general observations can be made about the paint finishes on the cabins. First, there is very little remaining paint evidence on the majority of the samples removed by BCA, particularly those removed from the siding of the cabins. Some samples retain as many as eight or ten paint layers, but many have only one or two finish layers. The general lack of paint suggests that earlier paint evidence may have been lost.

In addition, many of the wood substrates appear rough and weathered in the samples removed by BCA, a characteristic also visible on site (fig. 3). This type of rough surface was mostly found in the siding samples, where the wood appears uneven and dark, and the subsequent paint layers have seeped deep into the wood surface. This evidence suggests several possibilities: 1) the wood was unfinished originally, and later paint layers were applied to a weathered and oxidized surface; or, 2) the wood was finished originally, and the finish

weathered off before new paint was applied; or 3) the wood siding was originally rough-hewn lumber, which would account for the uneven surface of most of the samples. The rough-hewn lumber would have fit into the rustic aesthetic of the cabins. If the wood originally featured a rough surface, it would be difficult to determine if it was originally painted.

Finally, it appears that similar paint finishes (color and type) are on multiple cabins, suggesting that some cabins may have had a similar appearance at certain points in history. It also could suggest a single hand applying the paint or a single source for the paint.



Figure 3: Rough painted surface of the wood siding.



Figure 4: Sneed Cabin, east elevation.

4.2 Observations by Cabin

4.2.1 Sneed (Cabin 1)

The Sneed Cabin is the only cabin in Daisy Town built as a log building (fig. 4). The building currently has a yellowish brown paint on the horizontal logs, and a white paint on the log ends at the corners. The log ends of the cross beams are painted yellow like the horizontal logs. The window and doorframes are white, and the chinking is unpainted. According to the HSR, some significant repairs were made to the building by NPS in the 2000s, including removal of some portions of the front and back porches, repairs to the log walls on the southwest corner of the building, and removal and salvage of several window sash.¹ Sampling was focused on the portions of the building that were believed to be original.

Three samples from the Sneed Cabin were analyzed in cross-section, including one sample from a horizontal log on the east wall (ELK.1.1c),

¹ Joseph K. Oppermann–Architect, P.A., “Sneed Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2015), 37..

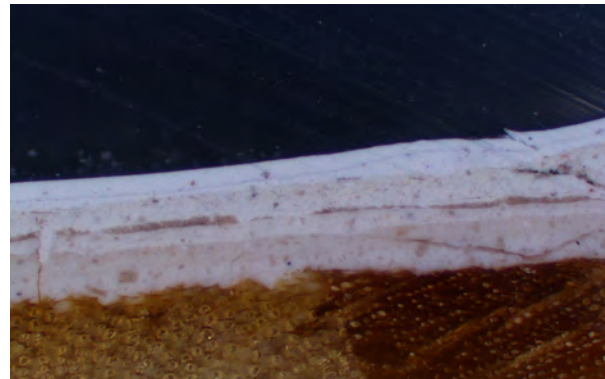


Figure 5: Sample ELK.1.2, 40x magnification, visible light (above) and UV light (below). All of the layers of this door surround are white.

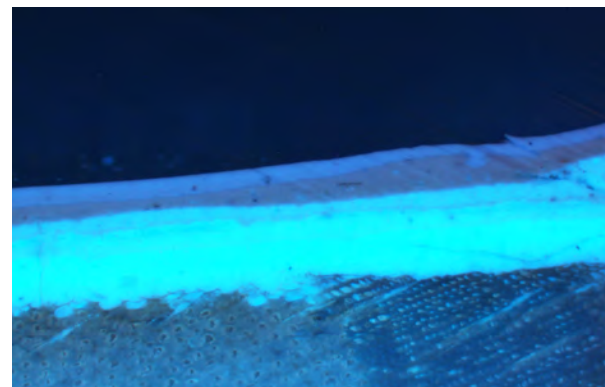




Figure 6: Smith Cabin, east elevation.

one from the front door surround (ELK.1.2), and one from a windowsill (ELK.1.4).

The sample removed from the log wall showed one layer—the current yellowish brown. No evidence of another color is visible underneath the current layer, nor is there evidence of a clear finish on the wood surface. It is possible that the logs were originally unpainted, though it is likely that the log ends were painted as a protective coating.

The samples removed from the door surround and windowsill are similar when viewed in cross-section. Both contain approximately five campaigns of whites. While the wood surfaces appear slightly uneven, it is not clearly stripped or worn (fig. 5).

4.2.2 Smith (Cabin 2)

The Smith Cabin is currently finished in two different paint schemes and the front has two front doors, suggesting that the cabin had been used as two separate residences at the time the NPS acquired the building. The cabin was built circa 1910 as a square block with a wrap-around porch and rear porch. Modifications, including enclosing portions of the rear porch, extending several rooms and screening in the side porch, occurred

at unknown dates.² The cabin is current painted blue-green with yellow windows and doors on the south half of the building, and red with yellow doors and window surrounds and red sash on the north half of the building (fig. 6). The porch of this cabin is painted in matching colors as well. At the southwest corner of the building is a small open porch with board and batten siding painted blue and some trim painted white.

Most samples were removed from the east (front) elevation. In addition, samples were removed from the southwest porch as the siding in that location was particularly protected whereas the front elevation appeared very thin and worn. On-site examination showed that the front doors and windows contained similar paint histories under the current paint, so samples were removed from only one door and window. Samples were removed from: east elevation siding (north side – ELK.2.4); south elevation siding (ELK.2.1); east elevation south door surround (ELK.2.5) and door (ELK.2.6 and ELK.2.8); and east elevation window sash (ELK.2.7). No samples were removed from the porch.

Both siding samples exhibit a rough and darkened wood surface with an early blue-green paint (fig. 7). Sample ELK.2.4, from the north portion of the

² Joseph K. Oppermann—Architect, P.A., “Smith Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2014), 19.

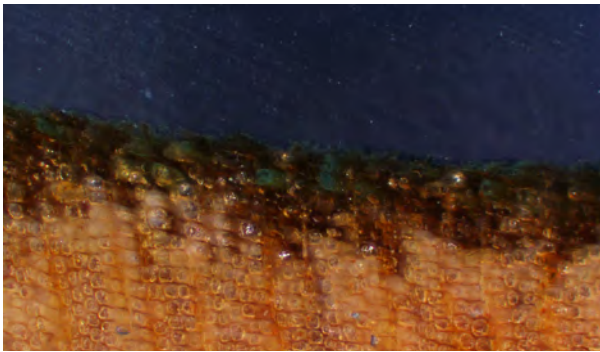


Figure 7: Sample ELK.2.1, 40x magnification, visible light (above) and UV light (below). The wood surface is worn and darkened, and the only paint is a dark green that is not a continuous layer and does not auto-fluoresce.

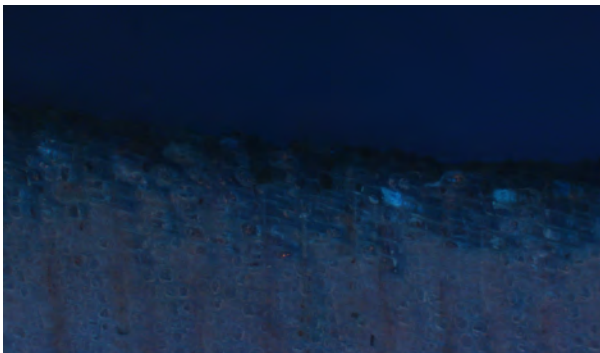
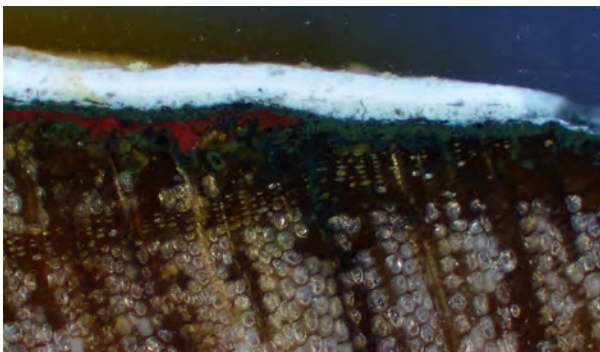
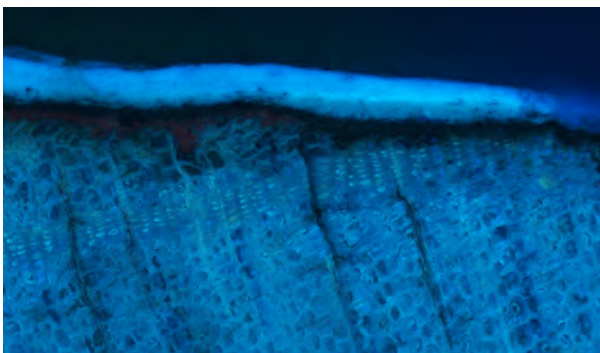


Figure 8: Sample ELK.2.6, 40x magnification, visible light (above) and UV light (below). Early colors include green and red.



building, also contains the current red paint, which is not an original color. The blue-green under the red is bluer than the blue-green exposed in sample ELK.2.1.

The samples removed from the south front door contained multiple paint layers. Each sample contains traces of a dark green paint in the pores of the wood, although generally not enough to constitute a continuous paint layer. The door surround (ELK.2.5) contains four to five white layers after the traces of dark green and yellow as the most recent layer. The two samples of the door are slightly different, with the sample removed from the middle rail (ELK.2.6) containing more layers overall. This sample has a red on top of the traces of dark green, followed by another dark green and three to four layers of white followed by the current yellow (fig. 8). As with the siding, the wood surfaces appear rough and darkened, although not as rough as the siding substrates. The window sash (ELK.2.7) is similar to the door but the wood appears to be a hardwood, rather than the softwood of the door. The window sash contains traces of dark green in the wood, followed by red and dark green, two whites, and the current yellow.

4.2.3 Higdon (Cabin 3)

The Higdon Cabin is an example of box-frame construction, built circa 1910 (fig. 9). The building is one story with an “L” configuration and a long porch on the front elevation. Several rooms were added to the rear of the building in the early twentieth century, including the rear porch. According to the HSR, the front porch floor, posts, and balustrades were replaced during Higdon ownership, likely in the late 1970s. The Higdons were also likely the ones who began to enclose the rear porch, a project that was never finished. In addition, NPS made repairs in 2008-2009, including replacing portions of the front porch posts and balustrades.

Currently, the building is painted green along the front (west) elevation, including both the board and batten siding and the underside of the porch, and blue on the siding along the sides. The blue on the sides is highly weathered. The windows



Figure 9: Higdon Cabin, east elevation.

and doors are mostly white and cream, although a few sash are light green. The front porch posts, balustrade, and floor are unpainted, however, the rafters, likely original, are painted green.

The rear porch (Room 107 in the HSR) was added in the early twentieth century. The south and west walls of that room are the same board and batten siding as elsewhere on the exterior, and are currently painted blue. Work on enclosing the rear porch began in the late 1970s, but was never finished. This suggests that the blue color on the south and west walls at the rear of the building is pre-1975.

Four samples removed from the Higdon Cabin were examined in cross-section, including the front door (ELK.3.1); the board and batten siding on the west elevation (ELK.3.4); a window surround on the west elevation (ELK.3.5) and the front screen door (ELK.3.6). Samples ELK.3.1, 3.5 and 3.6 all contain white as the earliest existing finish.

The sample removed from the front door (ELK.3.1) contains several layers of white/off white. The paint layers appear separated from the wood substrate (fig. 10), and there may be an

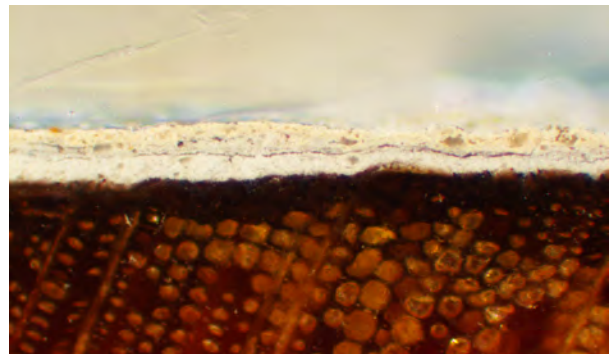
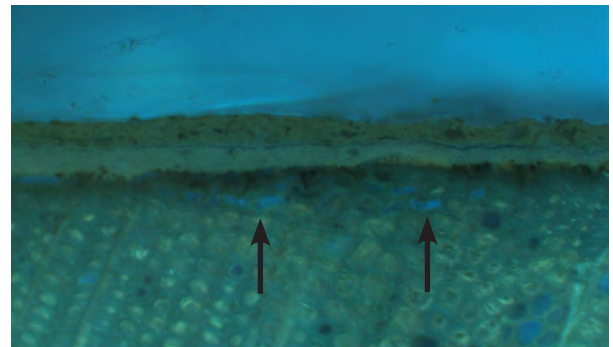


Figure 10: Sample ELK.3.1, 40x magnification, visible light (above), UV light (below). The paint has separated from the wood at some locations (black arrows), but it appears as if the first layer may be a brown followed by several layers of off-white.



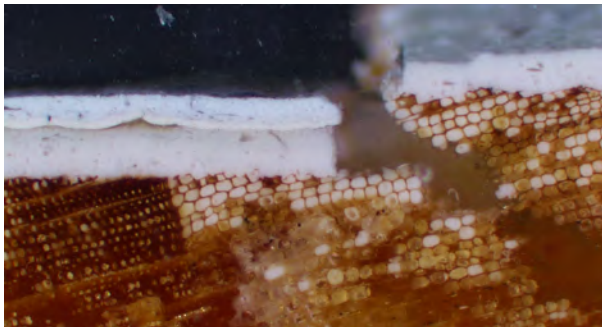


Figure 11: Sample ELK.3.5, 40x magnification (above) and ELK.3.6, 100x magnification (below). The paint history of these two samples is similar, although ELK.3.6 has more recent paint layers.

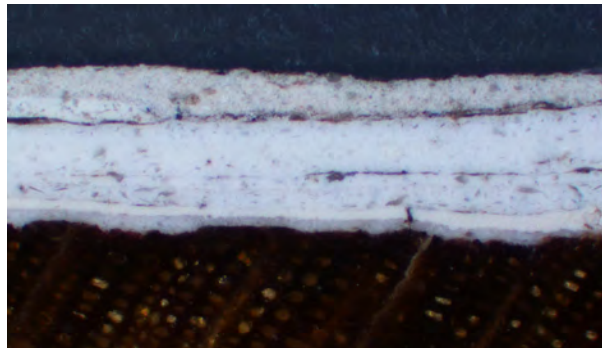
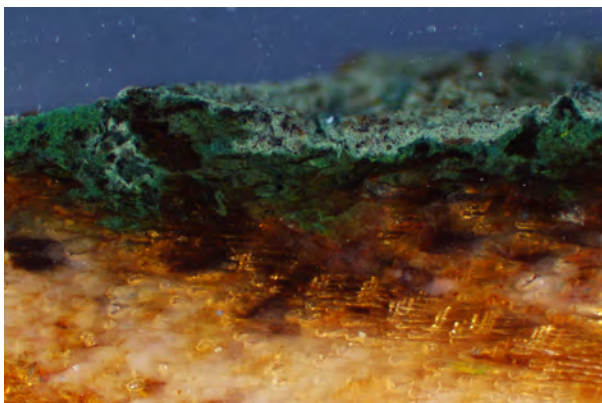


Figure 12: Sample ELK.3.4, 40x magnification, visible light (above) and UV light (below). The surface of this sample is rough and darkened. The green paints do not auto-fluoresce.



early brown or blue. The wood does not appear particularly weathered.

Samples ELK.3.5 and 3.6 contain similar paint histories (fig. 11). The earliest layer on both is a somewhat translucent white and the next layer is an opaque off-white. Sample ELK.3.6 contains more paint layers overall, but all are white.

The substrate of sample 3.4, removed from the siding, is highly rough and discolored at the surface (fig. 12). The first layer is a damaged layer of olive green paint followed by a lighter green. The unevenness and discoloration of the wood substrate suggests that it was exposed for a period of time.

4.2.4 Addicks (Cabin 5)

The Addicks Cabin is a one-story frame building with an open porch and was constructed circa 1910 (fig. 13). The walls of the building are currently painted white. The rear porch and the underside of the front porch are painted blue. The porch floor is currently green. Known alterations to the cabin documented in the HSR include: expansion of the original southeast room to the east; widening of the rear porch; further expansion of the rear porch in the 1970s; and expansion of front porch (also possibly in the 1970s).³

Five samples from the Addicks Cabin were analyzed in cross-section, including: west elevation German siding (ELK.5.1); west elevation door hinge stile (ELK.5.2); west elevation window sash (ELK.5.3); east elevation siding (ELK.5.4); and west elevation porch floor (ELK.5.5).

Samples ELK.5.1, 5.2, 5.3, and 5.4 all contain white as their earliest existing finish. Sample ELK.5.1 contains the most layers—eight total—that are all white/off white except for a small piece of green that may have been a loose piece from another element that was encapsulated into the paint layer (fig. 14). There are only traces of the first white finish in ELK.5.1, so it appears much of it had worn off before it was repainted. This siding is referred

³ Joseph K. Oppermann–Architect, P.A., “Addicks Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2010), 21.



Figure 13: Addicks Cabin, west elevation.

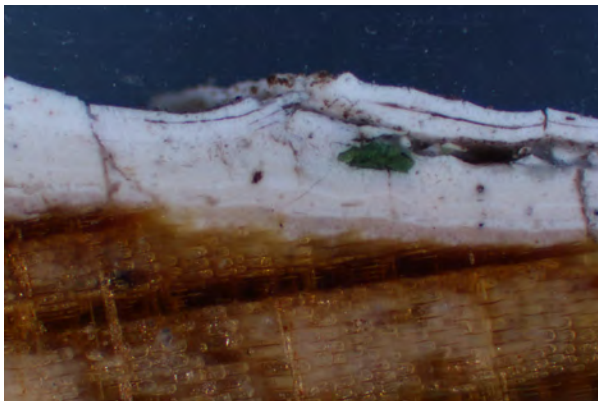


Figure 14: Sample ELK.5.1, 40x magnification, visible light (above) and UV light (below).

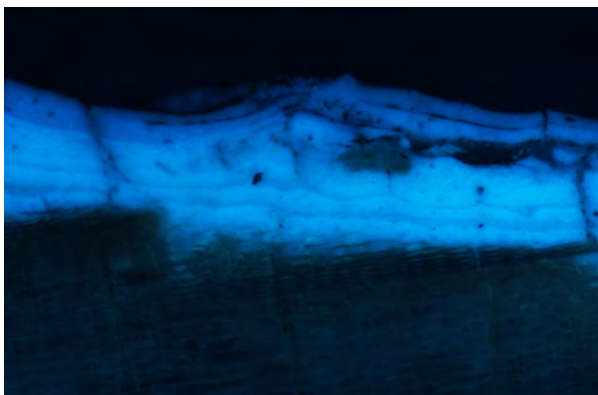
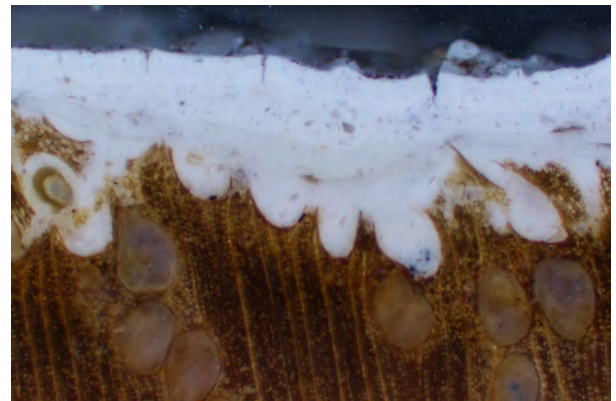
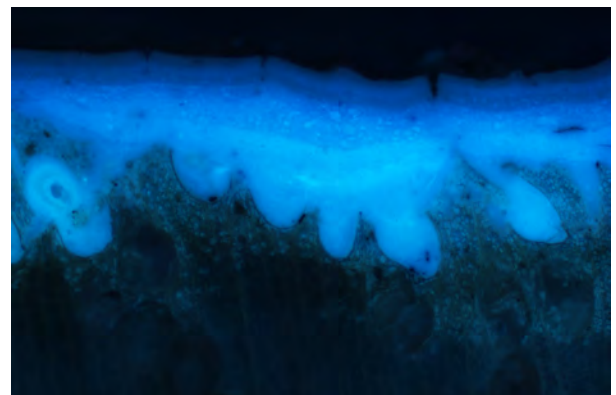


Figure 15: Sample ELK.5.4, 40x magnification, visible light (above) and UV light (below). The wood of this sample is different than the other samples.



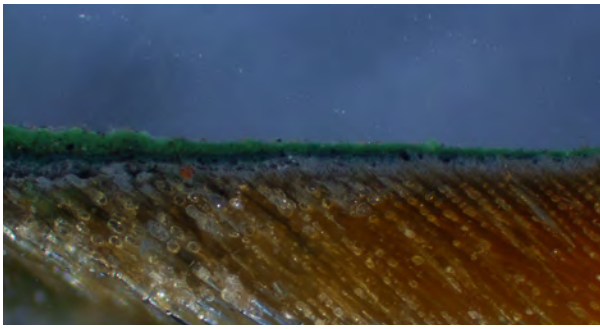


Figure 16: Sample ELK.5.5, 40x magnification, visible light (above) and UV light (below). Early layers are gray-green, later layers dark green.



to as “German siding” in the HSR and is different than the board and batten siding found on other cabins. It may have been different in texture or finish originally. The wood substrate of sample ELK.5.1 appears sound, while the surfaces of ELK.5.2 and 5.3 and are somewhat uneven, which,

combined with a small number of paint layers, may suggest lost earlier paint finishes. The substrate of sample 5.4 is a hardwood, while the other samples are softwoods (fig. 15). According to the HSR, this wall was added in the 1970s when the rear porch was extended so it is possible a different type of wood was used. However, it appears as if the white paint scheme was maintained.

Sample ELK.5.5 is the only sample from the Addicks cabin to contain a green paint. The sample contains three layers overall, the first a grayish blue-green, second a dark blue-green and the current a dark green (fig. 16).

4.2.5 Creekmore (Cabin 6)

The Creekmore Cabin was built in 1910 (fig. 17). The original one-story, three room rectangular cabin was modified several times throughout the twentieth century. The HSR identified four phases of work based on characteristics within the construction materials.⁴ The dates of the phases are not clear.

⁴ Joseph K. Oppermann–Architect, P.A., “Creekmore Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2014), 21-27.



Figure 17: Creekmore Cabin, east elevation.

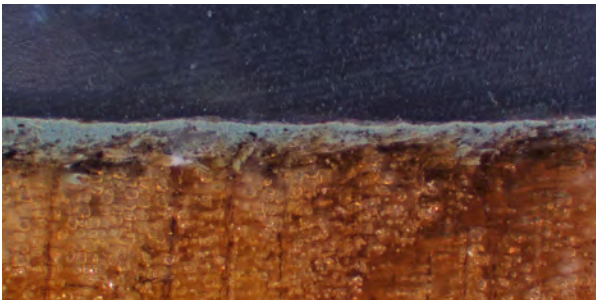


Figure 18: Sample ELK.6.3, 40x magnification, visible light (above) and UV light (below).



Figure 19: Sample ELK.6.5, 40x magnification, visible light.

The cabin was first expanded at the rear (west elevation) with an exterior porch. The second phase included enclosing the rear porch and adding side rooms (north and south of the porch). A side porch on the south was added in the third phase, connected to the existing front porch. The last phase converted this south porch into living space and extended the north side room. Enclosure of the south side porch likely occurred after 1979, as the HSR included a 1979 sketch from the family collection that shows the porch as exterior space. Sometime in the 1980s, the front porch was rebuilt and the rustic features of the porch were removed and replaced with standard dimensional lumber.

Currently, the siding on all sides and the windows and doors are green, with some white sash and a white rear door.

Four samples from the Creekmore Cabin were examined in cross-section. These samples include: one sample from the board and batten siding from the front (east) elevation (ELK.6.1); one from a window sash on the east elevation (ELK.6.3); one from a window surround on the east elevation (ELK.6.4); and one from the siding along the east elevation of the latest addition, on the north side of the building, believed to be from the 1980s (ELK.6.5).

All samples contain somewhat rough wood surfaces, and three of the four contain highly soiled or discolored surfaces. All contain blue-green or green paint finishes; however, the greens appear slightly different from one another. The window sash (ELK.6.3) contains one or two thin layers of a grayish green on a rough or stripped surface (fig. 18). Samples ELK.6.1 and 6.4 both contain a brighter blue-green on a rough and discolored surface. Sample ELK.6.5 contains a green on a highly rough and discolored surface (fig. 19). It is possible that the three different paints were applied at different times and were meant to imitate each other but are slightly different. The window sash may have been stripped, as historic images of the Creekmore Cabin show the window sash as white, while no white paint was found in the cross-section (fig. 20). In addition, while it is difficult to tell if the siding is stained, unpainted or just worn in the historic photographs, it does not appear as if there is an opaque paint finish on the siding.



Figure 20: Creekmore Cabin, 1967. Note that the window sash and front door are white. The siding and window and door surrounds are dark, although it is not clear if they are painted or unpainted. (Joseph K. Oppermann—Architect, P.A., Creekmore Cabin HSR).



Figure 21: Mayo Cabin's west elevation.

4.2.6 Mayo (Cabin 7)

The Mayo Cabin was built circa 1910 (fig. 21). It is a one-story frame cabin with a servants' quarters behind it (discussed below in Section 4.2.7). It is believed that the original cabin consisted of two or three rooms and front and rear porches. The building was modified sometime after the mid-1930s during which time the east porch was expanded and enclosed.⁵ The board and batten siding is currently painted white, with white window sash and doors and green surrounds. The front porch and porch railing are also green.

Four samples removed from the Mayo Cabin were examined in cross-section. The samples include: one from the board and batten siding on the west (front) elevation (ELK.7.1); one from a window sash on the west elevation (ELK.7.2); one from a window surround (ELK.7.3) and one from the reverse board and batten siding on the east (rear) elevation (ELK.7.5).

The samples removed from the siding both contain only white paint layers. The paint history of both is similar, although ELK.7.1 contains more paint overall and appears to contain an earlier paint than ELK.7.5 (fig. 22). The earliest layer on both samples is a white paint. The substrate of sample ELK.7.1

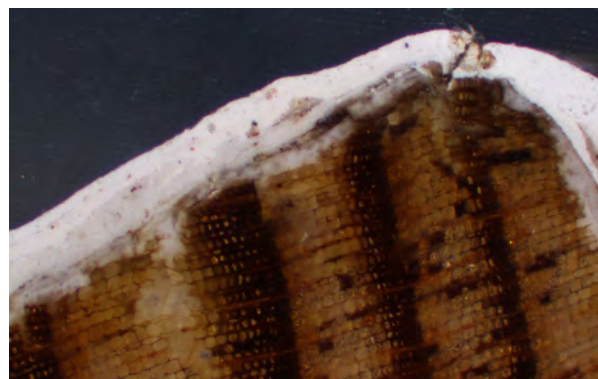


Figure 22: Sample ELK.7.1, 40x magnification, visible light (above) and UV light (below). The wood surface is worn and discolored, and the early green paint is soaked into the wood.



appears somewhat uneven, and the earliest white paint is visibly soaked into the wood. These siding samples, however, do not appear in general as worn and discolored as other siding samples in cross-section.

⁵ Joseph K. Oppermann–Architect, P.A., “Mayo Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2010), 20.

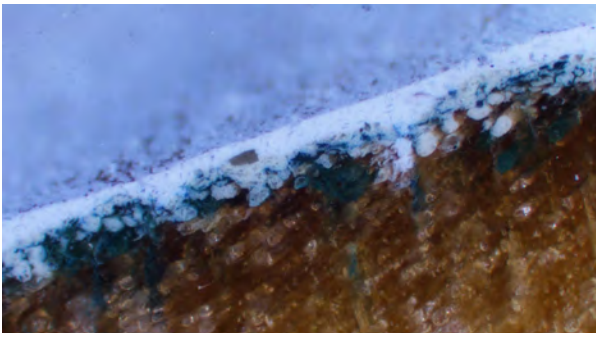
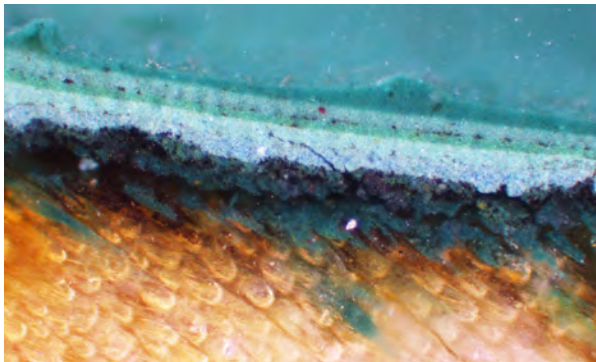


Figure 23: Sample ELK.7.2, 40x magnification (above), and Sample ELK.7.3, 100x magnification (below). Note the dark green layer soaked into the worn wood substrate in both.



The samples removed from the window sash and surround both show a rough wood substrate with the earliest paint layer soaked into the wood. The earliest paint is a dark green, and the paint layer itself is weathered or damaged. After the dark green, sample ELK.7.2 contains the current white, while sample ELK.7.3 contains a few layers of light blues and greens with the current dark green on top (fig. 23). Given the appearance of the wood substrate in cross-section, it is likely that these elements have either lost their original paint or, possibly, were originally unpainted.

4.2.7 Mayo Servants' Quarters (Cabin 7b)

The Mayo Servants' Quarters was built circa 1920 to the southeast of the Mayo Cabin (image 24). The Servants' Quarters is a one-story structure consisting of three small rooms and a small front porch. The room under the rear shed roof is believed to be an early addition. Elements of



Figure 24: Mayo Servants' Quarters.

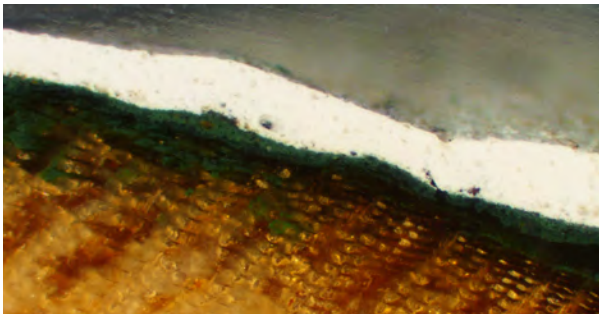
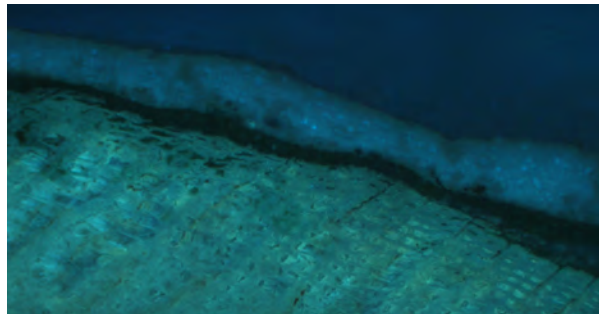


Figure 25: Sample ELK.7B.3, 40x magnification, visible light (above) and UV light (below). The earliest color is green, followed by the current white.



west (front) elevation (ELK.7B.1); the front door (ELK.7B.2); the board and batten siding on the east (rear) elevation (ELK.7B.4); and a window surround on the west elevation (ELK.7B.3). Sample ELK.7B.1, 7B.2, and 7B.4 all contain only white paint (image 25). The earliest existing paint layers on all three is an off-white, although only traces of it exist in ELK.7B.4, and the layer is damaged in ELK.7B.1 and 7B.2. It is possible that the siding of this cabin was originally white, as the wood surfaces do not appear as rough and darkened as in other samples, similar to the Mayo Cabin. The window surround, however, contains an early dark green paint. The surface of the wood appears slightly worn and the paint is soaked into the wood, but there is no evidence of an early white paint as was found on the siding and door. Given the evidence visible in cross-section, it seems like the Mayo Servants' Quarters was painted in the same colors as the main Mayo Cabin.

4.2.8 Cain (Cabin 8)

the front porch were replaced in the 1970s.⁶ The building currently has board and batten siding painted white. All windows and doors as well as porch elements are also white.

Four samples removed from the Mayo Servants' Quarters were examined in cross-section, including: the board and batten siding on the

The Cain Cabin was built circa 1915 (fig. 26). It is a one-story frame house with front porch and a small side porch. While there is little documentation about changes to the building, the HSR identified several phases of construction based on physical evidence.⁷ The original three-room cabin was enlarged multiple times, with the last modification occurring at the southwest corner of the building

⁶ Joseph K. Oppermann–Architect, P.A., “Mayo Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2010), 43.

⁷ Joseph K. Oppermann–Architect, P.A., “Cain Cabin Historic Structure Report,” Great Smoky Mountains National Park (prepared for the National Park Service, 2014), 21-23.



Figure 26: Cain Cabin, east elevation.

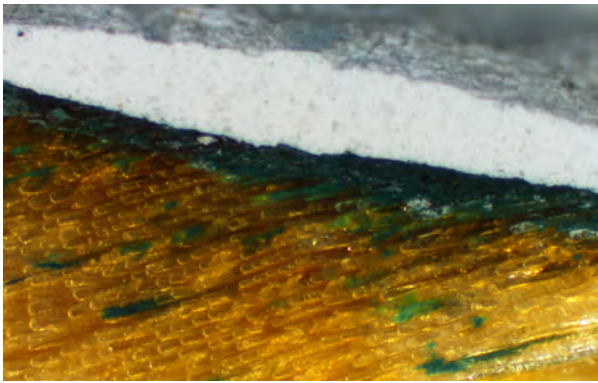


Figure 27: Sample ELK.8.4, 40x magnification, visible light (above) and UV light (below). The early green is found deep within the wood surface.

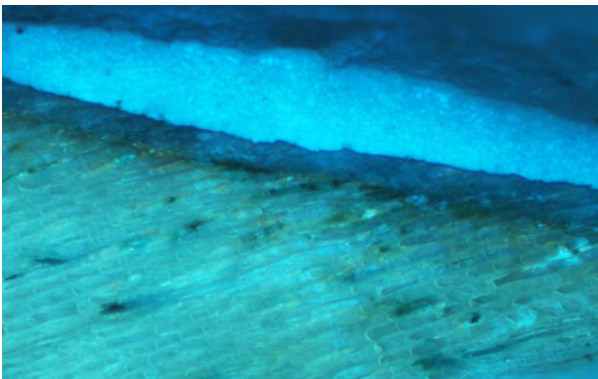
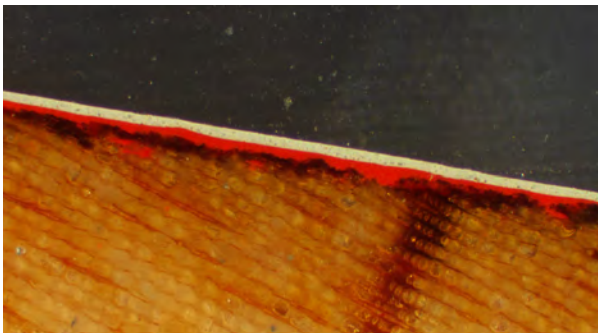


Figure 28: Sample ELK.8.5, 40x magnification, visible light (above) and UV light (below). The brown layer (arrow) is autofluorescent and may represent a resinous finish.



where a bedroom was added. This addition was believed to occur sometime during or after the 1970s. The building is generally painted in green on the siding, with white and green door and window surrounds. The front porch rafters and ceiling is white, and the front door is a sea foam green.

Seven samples were analyzed in cross section, including several samples from the known late addition for comparison to what is believed to be earlier or original construction. Samples from the following areas were examined: board and batten siding at the east (front) elevation, presumed to be original (ELK.8.1); a window surround (ELK.8.3) and sash (ELK.8.4) on the east elevation; the front door (ELK.8.5); a porch rafter from the southwest addition (ELK.8.6); siding from the southwest addition (ELK.8.7); and a rafter from the front porch (ELK.8.9).

The samples removed from the original siding and window all show rough and darkened wood substrates with green paint soaked into the wood (fig. 27). This dark green paint does not manifest as a clear paint layer, as much of the paint is in the pores of the wood. Sample ELK.8.4 may have an additional brown or dark green paint on top of the early dark green. After this worn paint is the current paint finish.

The front door contains evidence of several paint colors (fig. 28). The first color is a green, but it is only seen in traces in the pores of the wood, so it is unclear if it is an intentional paint layer. Following the green is a brown that is very thin and damaged. The layer may be a resinous finish as it is autofluorescent. After the brown is a red, also thin, followed by the current sea foam green, also thin. The surface of the wood appears somewhat worn but is not discolored.

The sample removed from the porch rafter may represent a later element, as the wood surface appears intact and it contains only two layers, the earliest a light blue.

The two samples removed from the southwest addition both contain wood that is not as worn and discolored as the samples removed from the east elevation, nor is the early green paint soaked in a deeply (fig. 29). However, the green is thin and uneven, particularly on the siding. In addition,

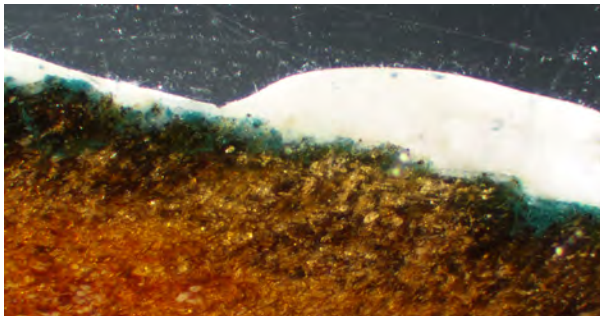
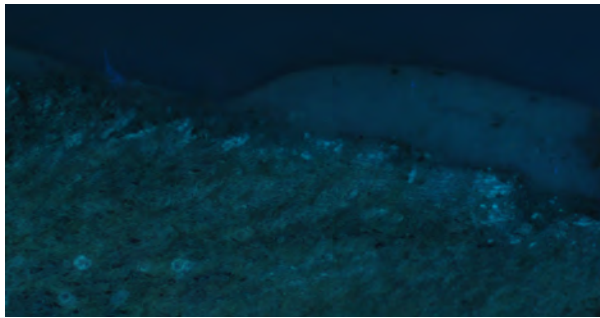


Figure 29: Sample ELK.8.7, 40x magnification, visible light (above) and UV light (below). The worn wood surface contains evidence of a green paint.



the substrate of the siding looks more like a stripped wood surface than is found on the other elements—the wood surface is feathered, without a distinct edge. The green on the siding appears different in cross-section than the current green paint on the east elevation, and is similar to the earlier paint. This could suggest that it was applied concurrent with or within the same era as the early green paint on the east elevation. The siding from the southwest addition also contains a later white, which appears similar to the later white applied to the window elements on the east elevation.

4.2.9 Galyon (Cabin 9)

According to the draft HSR, the Galyon Cabin was built circa 1910 and the Galyons were one of the last to hold a lease in Daisy Town. It is believed that the center square room is the original portion of the cabin, with an early addition (c. 1930s) to the east and later additions to the east, north and south. A portion of the front porch was enclosed in the mid-1960s, and several other modifications were made at unknown dates.⁸ The site also features a guest quarters, constructed circa 1965, that was not included as part of this study. The cabin features a deep half porch on the west (front) elevation that wraps around to the north (image 30). Adjacent to the porch on the front elevation is a room that extends to the front of the porch roof. The original walls of the cabin are constructed of wide boards without battens, while the other walls have battens. Galyon Cabin is currently painted red-brown, but some of the siding and the porch ceiling are unpainted. The window sash and surrounds are painted both white and yellow, and the front door is yellow.

Seven samples from the Galyon Cabin were examined in cross-section, including: a sample from the vertical siding at the west elevation (ELK.9.1); one each from the batten of the board and batten siding at the west (ELK.9.2) and south elevations (ELK.9.3); one each from the west elevation window sash (ELK.9.4) and surround

⁸ The Jaeger Company, "Galyon Cabin Historic Structure Report Draft" Great Smoky Mountains National Park (prepared for the National Park Service, 2016), 12.



Figure 30: Galyon Cabin, west elevation.

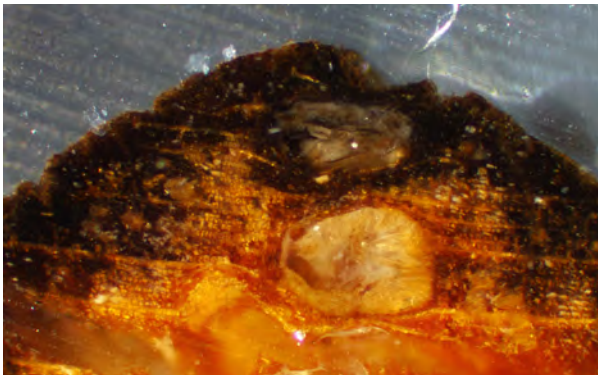


Figure 31: Sample ELK.9.1, 40x magnification, visible light (above) and UV light (below).

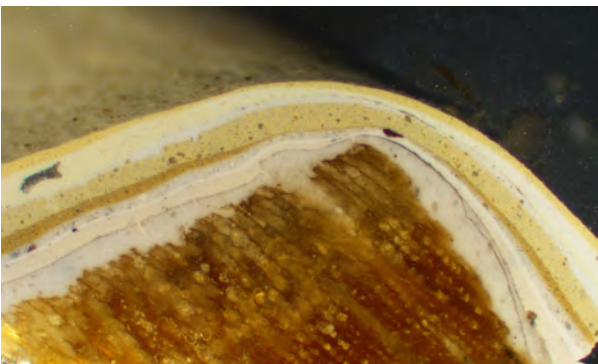
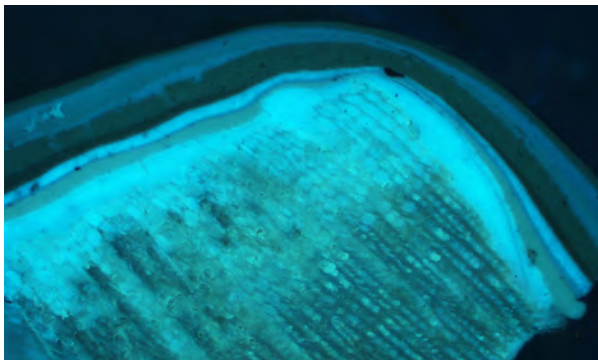


Figure 32: Sample ELK.9.7, 40x magnification, visible light (above) and UV light (below). The earliest layer is white and later layers yellows.



(ELK.9.5); and one each from the front door (ELK.9.6) and front door surround (ELK.9.7).

The three samples from the siding all contain one layer of red-brown paint. The wood surfaces of all three samples are worn and rough, and sample ELK.9.1 is particularly darkened (fig. 31). It is possible that the woods of these three samples are not the same as some two appear to be hardwoods and one appears to be a softwood, suggesting different dates of installation.

The sample from the front door surround (ELK.9.7) contains ten layers of paint—more layers than in typically found on most of the cabins (fig. 32). However, the wood substrate also appears somewhat uneven, suggesting exposure or possibly stripping. The earliest existing paint layer is a white with a soiled surface, followed by a partial layer of a similar white. The next layer is a cream. Following the cream is a very thin white and a thicker off-white. After this, the colors turn to yellow, including a yellow-tan, yellow, light yellow, and current yellow. The sample from the front door, in contrast, only contains four to five layers. These layers appear similar in cross-section to the last five layers of the surround. The substrate of ELK.9.6 does not appear particularly worn, although the surface is somewhat darkened, possibly soiled.

There are few paint layers on the samples from the window. The window surround (ELK.9.5) contains just two white layers that are soaked into the wood substrate. The wood surface is uneven. The window sash (ELK.9.4) contains three layers. The first is a very thin white, followed by two yellows—the current color.

4.2.10 Baumann (Cabin 10)

The Baumann Cabin is a unique design in the Daisy Town collection (fig. 33). The building is generally square, with a raised hipped roof and a wraparound porch at the front and sides. The original cabin was built circa 1910, and consisted of eight rooms. The raised hipped roof appears to define the original core of the building. The cabin's second owner, J. Fred Baumann, built an addition to the rear of the cabin in the late 1930- early 1940s. Several changes were made in the 1980s,



Figure 33: Baumann Cabin, east elevation.

when the front porch was rebuilt and a rear porch enclosed.⁹ Currently, the building has blue-green paint on the siding and most of the porch, and a dark green-blue on the first floor window sash. The window surround and the front door are white, as are the walls and clerestory windows of raised hipped roof.

Two samples were analyzed in cross-section. The door, door surround and window sash and trim all appeared to be the same on-site, so one sample from the window surround was removed for cross section analysis (ELK.10.2). In addition, a sample was removed from the front elevation siding (ELK.10.1) under the porch. The raised hipped roof was not accessible.

Both samples exhibit a worn wood surface and disturbed early paint layer. Sample ELK.10.1 shows a darkened and uneven wood surface typical of many board and batten siding samples, with dark green paint seeped into the wood (fig. 34). The layer is thin and damaged. Sample ELK.10.2 contains traces of a dark green paint, some of it encapsulated within the later white paint layers. Again, the surface is worn or stripped, but not as darkened as sample ELK.10.1.

While samples were not removed from the raised hipped roof, historic photographs (from the 1940s

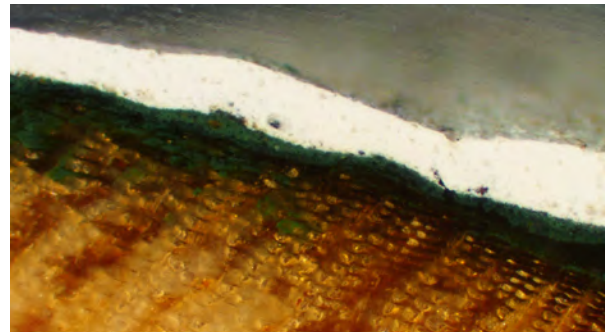


Figure 34: Sample ELK.10.1, 40x magnification, visible light (above) and UV light (below). The sample has an uneven and darkened surface with a dark blue-green paint.

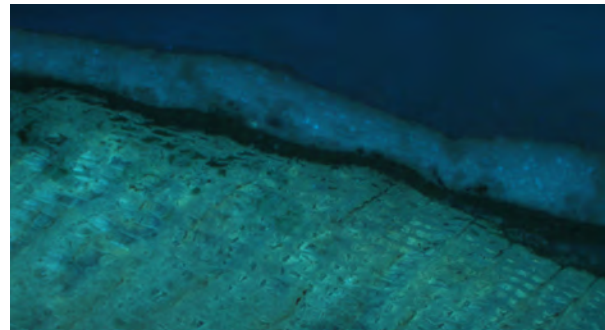


Figure 35: Baumann Cabin, 1940s. (The Jaeger Company, Baumann Cabin HSR).

⁹ The Jaeger Company, "Baumann Cabin Historic Structure Report Draft," Great Smoky Mountains National Park (prepared for the National Park Service, 2016), 11.

and 1960s) included in the cabin's HSR shows the monitor roof as light in color, and possibly the front door surround and front door as well though they are less visible in the photographs (fig. 35). Thus, it appears as if the light colors have been exposed on the cabin for more than 70 years.

4.2.11 Scruggs-Briscoe (Cabin 11)

The Scruggs-Briscoe Cabin is a narrow cabin with a deep front porch (fig. 36). The original cabin was built sometime between 1919 and 1924, and was extended several times to the rear and south sometime before the early 1940s.¹⁰ It is believed that the cabin has remained essentially in the same form since the early 1970s. The cabin currently contains a number of different paint colors on the board and batten siding, including green-blue, bright blue, and a medium blue (fig. 37). The window surrounds are white and the sash brown while the doors and decorative screen doors are green. The front porch is partially repaired with new, unpainted wood.

¹⁰ The Jaeger Company, "Scruggs-Briscoe Cabin Historic Structure Report Draft," Great Smoky Mountains National Park (prepared for the National Park Service, 2016), 12.

Cross-sections of samples removed from six locations were analyzed: the west (front) elevation window surround and sash (ELK.11.1 and 11.6); the board and batten siding on the west elevation (ELK.11.2); a front porch ceiling rafter (ELK.11.3); the front door (ELK.11.5); and the front screen door (ELK.11.4).

As on other cabins, the sample removed from the siding (ELK.11.2) showed a highly uneven wood substrate and an uneven/damaged dark green paint (fig. 38). The surface of the wood is darkened, suggesting long-term exposure. The rafter at the porch ceiling (ELK.11.3) appears similar in cross-section, as does the window surround, although the window surround is currently painted white.

The window sash appears to have one layer of very thin brown. The surface of the wood is slightly worn. The front door also contains one layer of paint, a green. Again, the surface of the wood is only slightly worn. The only paint layers on the front door and the window sash are very thin and do not look like modern paints in cross section. This could mean that the paint on these elements is original. The wood substrates do not appear stripped, although they are dark and could be weathered.



Figure 36: Scruggs-Briscoe, west elevation.



Figure 37: Various blues on different elements of the Scruggs-Briscoe cabin.

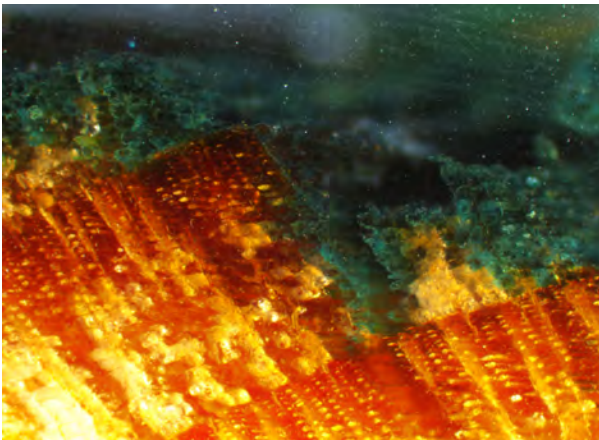


Figure 38: Sample ELK.11.2, 40x magnification, visible light (above) and UV light (below). The wood substrate is uneven and had what appears to be one green paint.

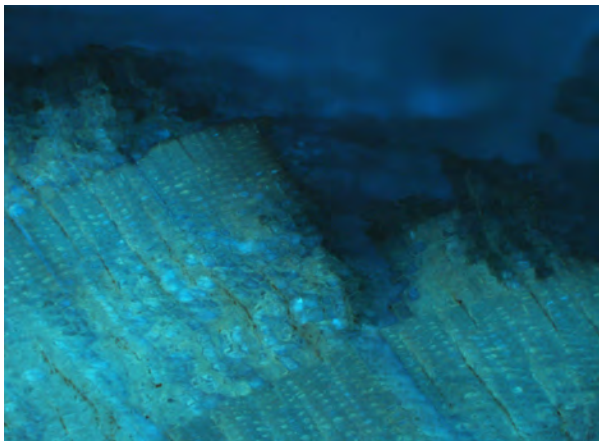
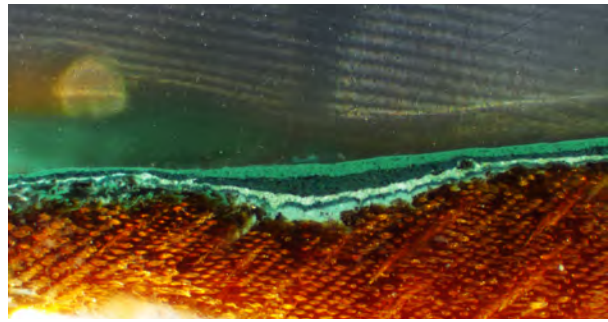
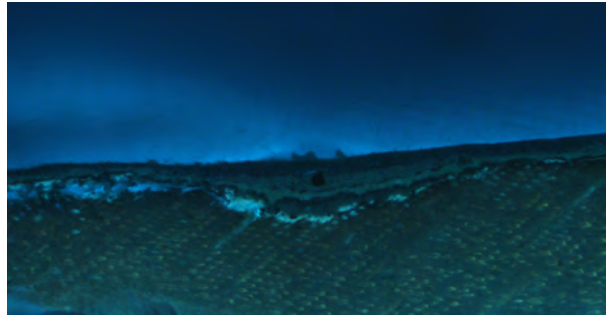


Figure 39: Sample ELK.11.4, 40x magnification, visible light (above) and UV light (below). The wood is uneven.



The screen door (ELK 11.4) contains several paint layers, mostly green (fig. 39). The surface of the wood is somewhat worn, possibly stripped. There may be a partial early brown paint or resinous layer on the surface, but is unclear in cross section—the surface of the sample appears to auto-fluoresce but it may be that the paint is separating from the substrate. Following the possible brown is a light green and a worn dark green. A thin white is on top of the dark green, and then two other greens.

4.2.12 Cook (Cabin 13)

The Cook Cabin is a one-story rambling cabin with a partial front porch (fig. 40). The cabin was built c. 1913 and consisted of a main core of four rooms with a front and a rear porch. The cabin was extended to the rear several times at unknown dates (possibly 1930s–1950s).¹¹ Currently, the board and batten siding is painted blue-green, the window and door trim is blue-green, and the windows and doors are white. There are screens on many windows that are painted a bright blue-

¹¹ The Jaeger Company, "Cook Cabin Historic Structure Report Draft," Great Smoky Mountains National Park (prepared for the National Park Service, 2016), 8.



Figure 40: Cook Cabin, west elevation.



Figure 41: Unpainted porch ceiling with new repair wood.

green. The front porch floor is painted gray. There has been some selective replacement of elements, including part of the porch ceiling and floor, with new, unpainted wood. However, the rest of the porch roof ceiling is also unpainted (fig. 41). While this section of the porch is believed to be original, is not clear if these particular elements of the porch ceiling are original and were originally unpainted.

Six samples from the Cook Cabin were analyzed in cross-section, including the window sash (ELK.13.1) and surround (ELK.13.2) on the west (front) elevation; the front door (ELK.13.1) and the screen door (ELK.13.4); the siding (ELK.13.5); and the porch floor (ELK.13.6).

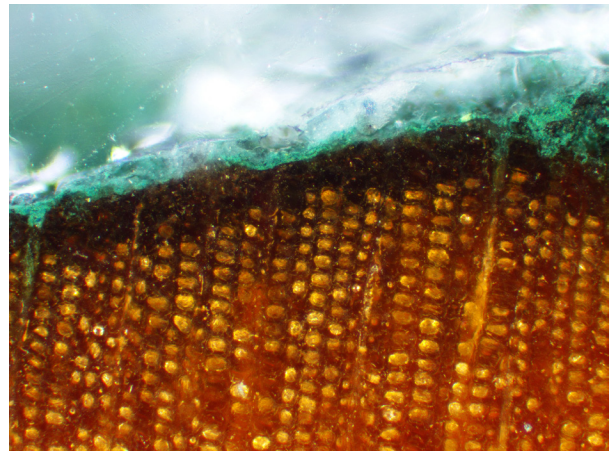


Figure 42: Sample 13.5, 40x, magnification, visible light (above) and UV light (below). The surface of the wood appears uneven.

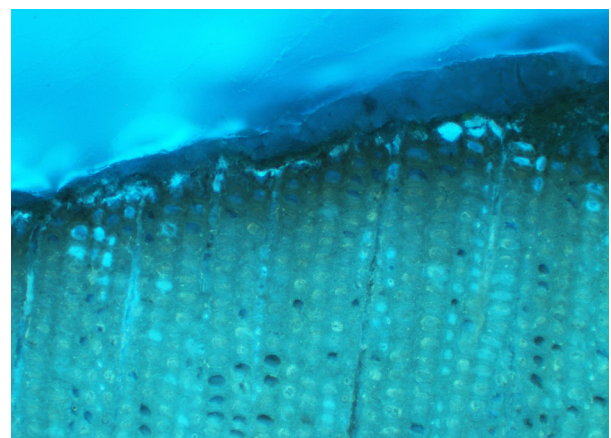




Figure 43: Hale Cabin, west elevation.

The sample removed from the siding contains what appears to be two green-blue paints on a darkened and partially weathered surface. The first is a green paint is seeped into the wood surface at a damaged area, with a thin layer of blue green on top. The blue-green paint appears more like a continuous thin coating where the wood is not damaged (fig. 42). This sample was removed from a protected location at the top of the wall under the porch roof, and it doesn't appear as rough as some other samples.

The surface of the sample removed from the window surround appears more darkened than the siding, and the blue-green paint is seeped into the wood. There is an earlier dark green that is only found in the wood underneath the current thin layer of blue-green.

The samples removed from the door and the window both contain what appears to be intact but darkened substrate. The earliest layer on both is a dark green, which is followed by several creams and whites on the door and one yellow on the window. The screen door, however, only contains one paint layer—the current blue-green.

The porch floor contains one layer of gray paint. The surface of the wood appears worn and the paint looks modern.

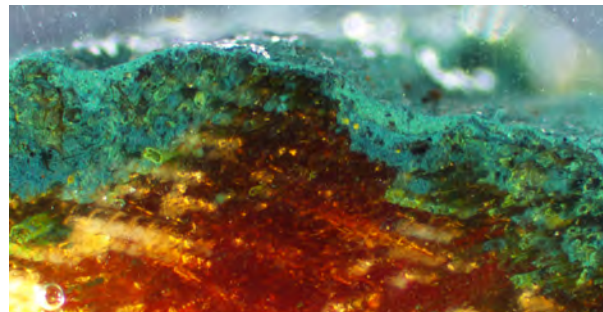


Figure 44: Sample ELK.15.1 (above) and 15.2 (below). 15.1 contains several different greens, while 15.2 contains one green.

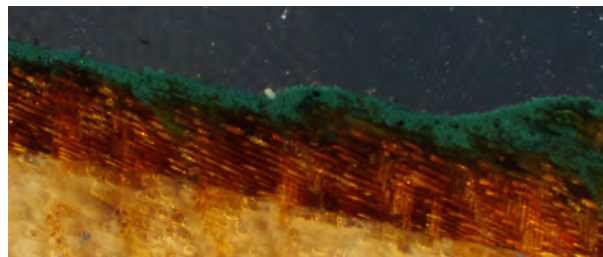


Figure 45: The substrate of ELK.15.3 is very rough, and the paint is soaked into the wood.

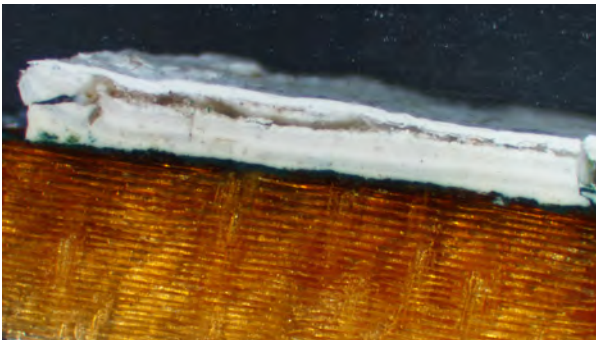
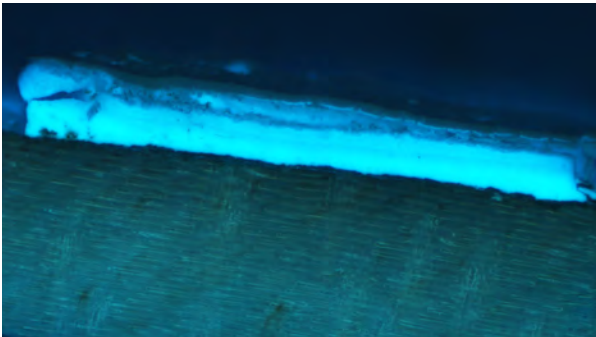


Figure 46: Sample ELK.15.4, 40x magnification, visible light (above) and UV light (below). The wood appears sound, with an early dark green.



4.2.13 Hale (Cabin 15)

The Hale Cabin is currently the southernmost cabin in Daisy Town (fig. 43). The cabin was built between 1914 and 1924, and originally likely consisted of four rooms. Several additions and extensions to existing features occurred throughout its history, but the cabin has remained largely the same for the last forty to fifty years.¹² The cabin features a large porch on the west (front) elevation that wraps around to the north and south. There are three doors on the west elevation that lead into the building: two doors at the center of the front portion of the west elevation, and a door on the recessed south portion of the elevation, accessible from the porch. All of the doors and windows are currently painted white, and the board and batten siding is a blue-green.

Samples from five locations were analyzed in cross-section. Three samples of siding were examined, including one from the west elevation (ELK.15.1), one from the enclosed porch at the east end of the south elevation—believed to be an

original exterior wall—(ELK.15.3), and one from an interior wall of the south room (ELK.15.2). This wall appeared similar to the exterior walls of the building, and it was theorized that it possibly was originally the exposed south wall of the cabin. In addition, one sample was removed from a window surround (ELK.15.6) and one from the front door (ELK.15.4).

The two samples removed from the west and south elevations appeared similar when examined in cross section. Both contained rough, weathered wood surfaces that are darkened, with paint seeped deep into the wood. The campaigns are difficult to decipher as the layers are not continuous, but the two samples do both appear to share a deep blue green and a yellow-green paint (fig. 44). The current color of ELK.15.1 is a blue-green, while the current color of ELK.15.3 is a bright blue. The sample removed from the interior also shows a somewhat rough and discolored wood surface. The only paint is the current dark green (fig. 45).

The samples removed from the window and door were similar in cross-section. The window contains approximately five layers, with the earliest a dark green. The dark green is thin, uneven and seeped into the rough wood surface. The green is followed by a light blue/white, then another one or two whites. The door also contains a dark green first layer, but the wood surface appears generally intact and not weathered (fig. 46). Following the dark green is a light blue/white, and then five whites/light grays. The current color on both elements is white.

4.2.14 Chapman-Byers (Cabin 38)

The Chapman-Byers Cabin is located down the road from Daisy Town, so it is not a part of the Daisy Town streetscape. The cabin is being retained because of its relationship with Col. David Chapman's association with the creation of the Great Smoky Mountains National Park. Because it is separate from the other Daisy Town cabins and it may be interpreted differently, emphasis was on identifying the earliest existing finishes of this cabin for this report.

¹² The Jaeger Company, "Hale Cabin Historic Structure Report Draft," Great Smoky Mountains National Park (prepared for the National Park Service, 2016), 11.



Figure 47: Chapman-Byers Cabin. The sleeping porch is believed to be an addition.

The cabin was built circa 1912 and reflects a Craftsman design influence (fig. 47). It is a one-and-a-half story structure, with a small entrance porch covered by a second-story sleeping porch. The sleeping porch is flanked by small dormers on the front and there is an open L-shaped porch on the rear. The HSR indicates that much of the original cabin remains intact with only cosmetic modifications; however, the sleeping porch is believed to be an addition.¹³ The building currently has green walls with white windows and doors, including surrounds. There is evidence of a dark green spray painting campaign on the south elevation as there is some overspray onto adjacent white window surrounds (fig. 48).

Four samples were analyzed in cross-section, including samples removed from: a post in the sleeping porch (ELK.38.2); the front door surround (ELK.38.3); a window sash on the east

(front) elevation (ELK.38.4); and the siding on the east elevation (ELK.38.5).

The sample removed from the front door surround shows a hardwood painted in a cream/off-white followed by a light gray and several whites (fig. 49).



Figure 48: Evidence of a spray-painting campaign on the side of the Chapman-Byers cabin.

¹³ Joseph K. Oppermann—Architect, P.A., "Chapman-Byers Cabin Historic Structure Report," Great Smoky Mountains National Park (prepared for the National Park Service, 2009), I.B.2.

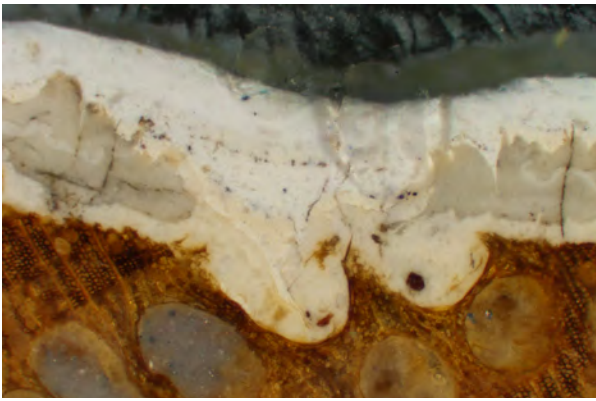


Figure 49: Sample ELK.38.3, 40x magnification, visible light (above) and UV light (below). This sample from the door surround contains all whites/creams.

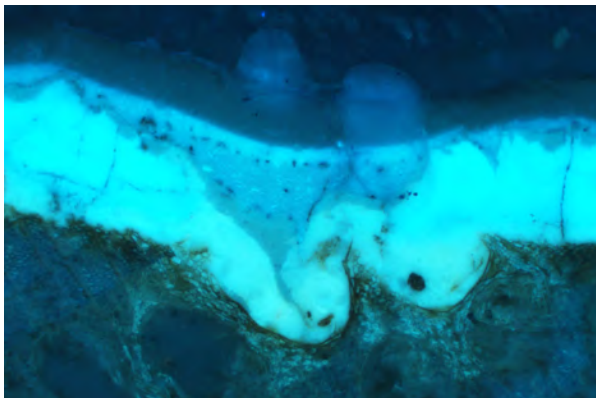
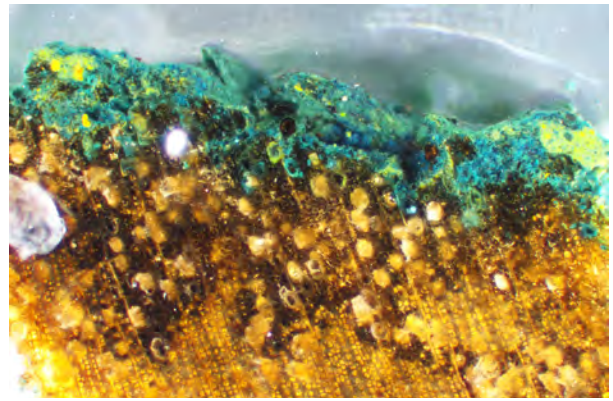


Figure 51: Sample ELK.38.5, 40x magnification, visible light (above) and UV light (below). This sample from the siding contains several layers, but they are very worn and it is difficult to decipher the layering. The wood substrate is worn and darkened.

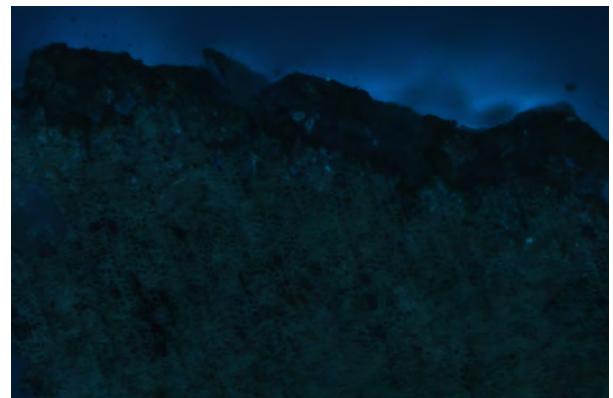
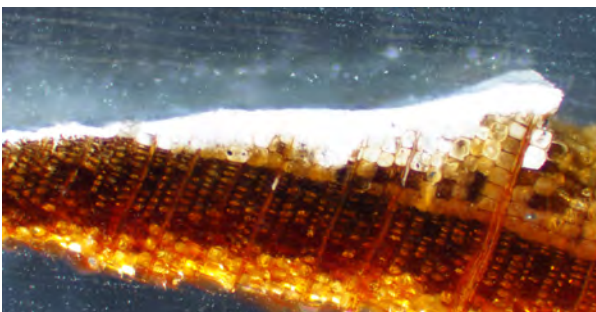
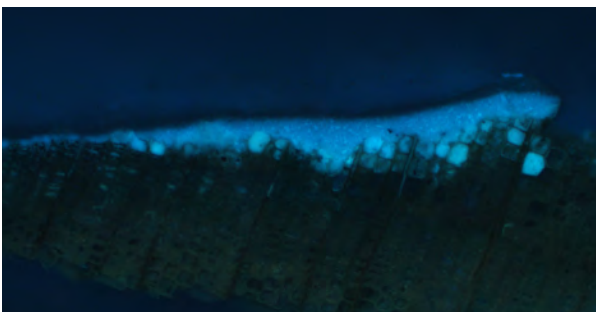


Figure 50: Sample ELK.38.4, 40x magnification, visible light (above) and UV light (below). This sample from the window sash contains only the current paint.



The surface of the wood is generally sound, and the cream/off-white likely represents an original finish. In comparison, the window sash sample consists of only one or two paint layers, both cream/white on a worn or stripped surface (fig. 50). The sample removed from the siding contains several green or yellow-green paints, but there is no clear layering structure, and none of the samples auto-fluoresce (fig. 51). The wood substrate appears worn and discolored, as if it was exposed, and there is no evidence of a clear coating. The sleeping porch posts contain only one layer of a blue-green—similar to one of the paints in the siding sample—on a somewhat worn surface.

Based on the appearance of the cross-sections, it appears as if the siding was unpainted originally and the front door and door surround was painted white. It is possible that the window sash and surrounds were also painted white.

4.3 Instrumental Analysis

Four samples were provided to Catherine Matsen for instrumental analysis. These samples include:

ELK.8.1: Cain Cabin, east elevation, siding

ELK.8.7: Cain Cabin, south elevation, siding (from 1970s addition)

ELK.13.4: Cook Cabin, west elevation, siding

ELK.38.5: Chapman-Byers Cabin, east elevation, south side of porch, siding

Original paint layers were isolated for analysis. Because of the thin nature of the paint layers, isolation of individual layers proved difficult. Several analysis techniques were employed to characterize the paint layers and to confirm findings, including: Fourier-transform infrared spectroscopy (FTIR); gas chromatography–mass spectroscopy (GC-MS); and scanning electron microscopy–energy dispersive spectroscopy (SEM-EDS). For historic finishes analysis, FTIR is typically used to identify organic materials, such as paint binders, and can also identify synthetic resins, inorganic pigments, and natural minerals. GC-MS is also used to identify materials such as binders, but can identify the materials at lower concentrations. SEM-EDS is used to identify particular elements in a cross section, which can help confirm the presence of particular materials, such as pigments.

Prussian blue pigment was found in all four samples. Prussian blue was the first synthetically produced pigment, first synthesized in 1704. Prussian blue is considered a fairly stable pigment, however it turns brown in the presence of alkaline materials. It also can appear to turn green if used in an oil binder, as the oil tends to yellow over time.¹⁴

In addition to Prussian blue, clays were identified in all samples. The presence of clays can represent dirt or, more likely, fillers in the paint layer. Clays and aluminosilicates are commonly used as fillers in paints. Clays were found as a primary component in several samples.

While no binder medium was clearly identified in any sample, evidence of a natural binding medium, such as oil or resin, was found in three of the four samples (ELK.8.1, 13.4, and 38.5). Sample ELK.38.5 showed two paint layers in SEM-EDS, but the earlier layer could not be adequately isolated for GC-MS. However, the GC-MS did include markers for a drying oil. FTIR was run on both paint layers, which identified the presence of an acrylic binder, commonly referred to as latex paint. It is assumed that the latex paint relates to the most recent paint layer, and the oil/resin from the GC-MS to the earlier layer. This is consistent with samples ELK.13.4 and 8.1. Sample ELK.8.7 was so thin, the wood fibers tended to overwhelm the spectra and the FTIR was unable to detect the presence of any binding medium.

The SEM-EDS also identified weak amounts of lead, barium, and chromium, which suggest low concentrations of lead white, barium white and yellow lead chromate. The fact that lead is identified in the sample suggests the paints were applied before 1978, when lead was banned in paint products. However, the amount of lead was so low, it was not possible to indicate which paint layer contained the lead.

Based on the instrumental analysis, it appears as if most of the early paints are similar and may represent the same type of paint. All contain Prussian blue, clays, and most appear to contain a natural binding medium such as oil or resin. Unfortunately, the only sample from a later addition was so thin, a binding medium could not be identified and the sample could not be fully compared with the other samples. However, the other elements are consistent with the other samples. All of the early paints do appear to be very leanly bound, with little binding media overall, suggesting perhaps that the paints were actually stains. It is also possible that the oil/resin soaked into the surface of the wood, leaving the pigment and inorganic elements of the paints on the surface of the wood.

¹⁴ Andrea M. Gilmore, "Analyzing Paint Samples: Investigation and Interpretation," in *Paint in America*, ed. Roger W. Moss (Washington, DC: The Preservation Press, 1994), 173-185.

5.0 Conclusions and Recommendations

A lack of documentation, such as historic photographs and records about the construction and maintenance of the cabins, and the nature of the physical evidence found on the cabins made it difficult to determine the original appearance of the cabins. However, some general statements can be made about the historic appearance of the cabins and guidance is provided for an appropriate restoration paint scheme.

The rough and darkened surface of the wood in many samples, particularly the siding samples, but also some window and door surrounds, could be interpreted several ways. It is possible that the siding was painted but early paint layers had worn off. However, there was no evidence of earlier finishes, clear or pigmented, underneath the greens and blues applied to the darkened surfaces. Moreover, the samples appeared rough and darkened whether or not they were removed from protected locations, such as underneath a porch roof, or more exposed locations. One would expect protected locations to not be as weathered. It is also possible that a rough and unpainted wood surface was an original feature of cabins. This would also help explain why protected locations, not just exposed locations, appear weathered in cross-section. One would imagine that if rough-hewn wood was used in the original construction, it was likely intended to be exposed. Unpainted, rough wood would have fit into the natural, rustic aesthetic of the cabins. However, it could also be possible that a paint or stain was applied on top. Unfortunately, this could not be confirmed with the cross-section examination or instrumental analysis performed as part of this study.

The earliest existing finish on most of the board and batten siding is a blue, green or blue-green. The instrumental analysis found that these paints contained Prussian blue pigment, clays (as filler), and a small amount of oil or resin binder, suggesting that they were applied more as a stain than a paint. It is also possible that the rough

texture of the wood absorbed much of the binder, thus reducing the amount of binder present at the surface of the wood. In addition to greens/blues, one cabin contained a red-brown early finish on similarly rough and darkened wood.

White was found as an early paint color on three cabins (Mayo, Mayo Servants' Quarters, and Addicks). This color may be original, as the wood does not appear as rough and darkened as in other samples. The white found on the Addicks cabin was from an area of German siding, which differed from the typical board and batten siding found on other cabins.

The finishes on elements like windows and doors varied from cabin to cabin. Many of the window surrounds appear similar in cross-section to the siding samples, and it is possible that they were treated the same as the siding. The historic images of the Creekmore Cabin from the 1960s show the window sash and door painted light while the siding, window surrounds and door surrounds were darker—possibly unpainted, though the resolution of the photographs is not high enough to make that determination. The window surround samples are often rough and dark at the surface, with damaged paint layers soaked into the wood. The most prevalent early color is also green/blue-green, although most have since been painted white. One sample from the Mayo Servants' Quarters contains an early green that is not on a rough surface, and two samples (from Galyon and Higdon), contain only white layers on somewhat rough but not darkened surfaces.

Samples from the window sash also varied from cabin to cabin. The wood substrates often appeared slightly uneven and/or dark, though generally not in the same way as the siding or window surrounds. In some cases, the paints had soaked into the wood, suggesting a weathered surface. The predominant early color is green, although early whites were also found. At least

one sample, removed from Creekmore, appears to have lost its early finishes since what is visible in the cross-section is different than what is visible in historic photographs.

In general, the wood substrates on the front doors appear mostly intact, although some of the early paint finishes are damaged. The most common early color found was dark green, and a few contained white. One cabin, Cain, contains what could be a clear coating. The early yellow found at the Galyon Cabin may not be original.

While the original appearance of the fifteen cabins is not fully understood, the restoration of the cabins will not involve taking the cabins back to their original appearance. The complex history of the cabins as well, as their continued use over the years, tells a unique story of the park and the changes to the buildings are part of the story. Therefore, as directed by the NPS, the recommended restoration paint colors are based on the most recently applied (i.e. current) paint colors on the cabins. These colors are believed to represent the appearance of the cabins when the leases ended for the cabins and, therefore, when the cabins were last occupied.

5.1 Recommended Paint Colors

The following pages contain color matches for the current colors on the front elevations of the cabins included in this study. Because of the limited number of paint samples removed for this study, not all elements of a building were sampled, so color matches are only provided for elements for which samples were available for color matching. It should be noted that some of the finishes on the siding appear to be a stain.

The printed colors included on the following pages vary from the actual color. Any attempt to reproduce these pages, including printing from the electronic version of the report, will distort the color of the provided chip. Only the actual color chip provided in the hard copy of the report or the color notation should be used for paint replication purposes.

Cabin 1: Sneed

Log Walls

Color Description: Yellow

Munsell Color Match: 2.5Y 6/6



Log Ends, Windows and Doors

Color Description: White

Munsell Color Match: N9.5

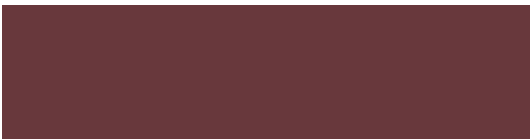


Cabin 2: Smith

Siding

Color Description: Red-brown

Munsell Color Match: 5R 3/4



Window and Door

Color Description: Light yellowish brown

Munsell Color Match: 2.5Y 6/4



Cabin 3: Higdon

Siding

Color Description: Green

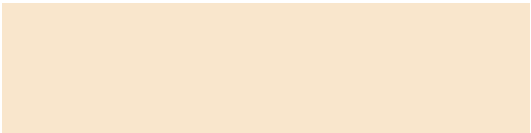
Munsell Color Match: 7.5GY 4/2



Front Door

Color Description: Very pale yellow

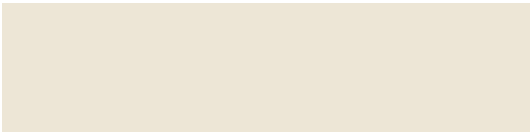
Munsell Color Match: 2.5Y 9/2



Screen Door

Color Description: Light cream

Munsell Color Match: 5Y 9/1



Window Surround

Color Description: 5Y 9/1

Munsell Color Match: 5Y 8.5/2

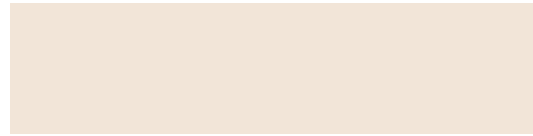


Cabin 5: Addicks

German Siding, Front Door, Window Sash

Color Description: White

Munsell Color Match: 10YR 9/1



Porch Floor

Color Description: Green

Munsell Color Match: 7.5GY 5/2



Cabin 6: Creekmore

Siding, Windows and Doors

Color Description: Green

Munsell Color Match: 7.5GY 5/2

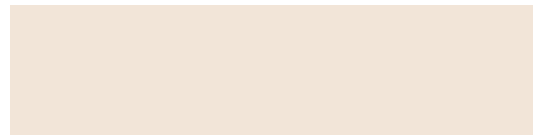


Cabin 7: Mayo

Siding

Color Description: White

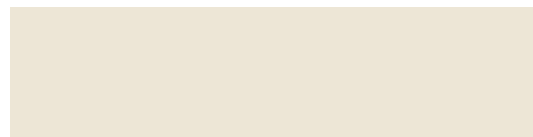
Munsell Color Match: 10YR 9/1



Window Sash

Color Description: Light cream

Munsell Color Match: 5Y 9/1



Window Surround

Color Description: Green

Munsell Color Match: 7.5G 3/4

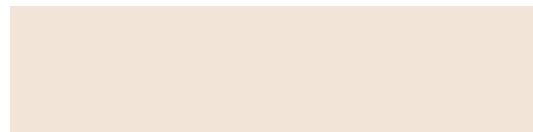


Cabin 7B: Mayo Servants' Quarters

Siding, Front Door, Window Surround

Color Description: White

Munsell Color Match: 10YR 9/1



Cabin 8: Cain

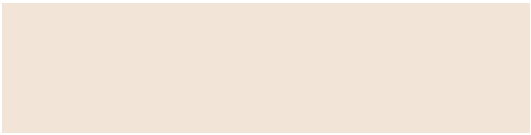
Front Door

Color Description: Green
Munsell Color Match: 2.5G 7/2



Window Sash, Porch Rafter

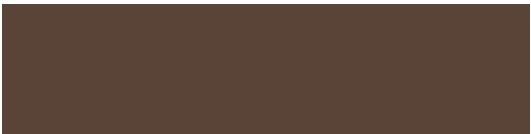
Color Description: White
Munsell Color Match: 10YR 9/1



Cabin 9: Galyon

Siding

Color Description: Brown
Munsell Color Match: 10YR 3/2



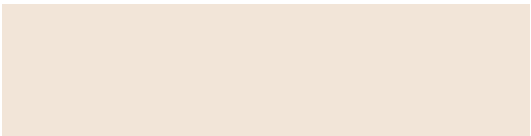
Window Sash

Color Description: Beige
Munsell Color Match: 2.5Y 8/4



Window Surround

Color Description: White
Munsell Color Match: 10YR 9/1



Door Surround

Color Description: Yellowish tan
Munsell Color Match: 2.5Y 8/6



Cabin 10: Baumann

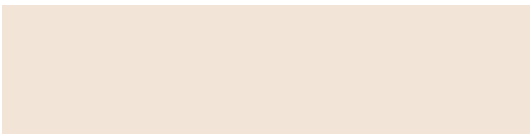
Siding

Color Description: Grayish blue-green
Munsell Color Match: 7.5BG 2/4



Window Surround

Color Description: White
Munsell Color Match: 10YR 9/1



Cabin 11: Scruggs-Briscoe

Siding

Color Description: Dark blue-green

Munsell Color Match: 2.5BG 2/2



Front Door, Porch Rafter

Color Description: Dark blue-green

Munsell Color Match: 2.5BG 3/2



Screen Door

Color Description: Dark green

Munsell Color Match: 10G 3/4



Window Sash

Color Description: Black

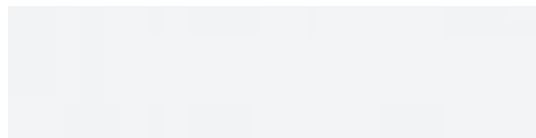
Munsell Color Match: N1.25



Window Surround

Color Description: White

Munsell Color Match: N9



Cabin 13: Cook

Siding and Window Surround

Color Description: Dark blue-green

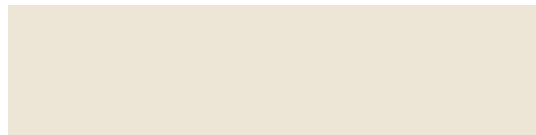
Munsell Color Match: 2.5BG 3/2



Window Sash

Color Description: Light cream

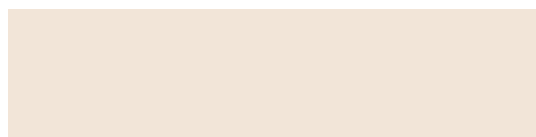
Munsell Color Match: 5Y 9/1



Front Door

Color Description: White

Munsell Color Match: 10YR 9/1



Cabin 13: Cook (cont.)

Screen Door

Color Description: Dark green
Munsell Color Match: 7.5G 3/2



Cabin 15: Hale

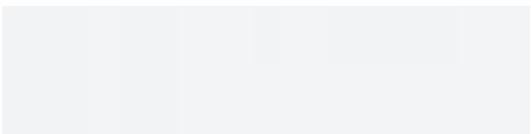
Siding

Color Description: Dark green
Munsell Color Match: 10G 3/4



Front Door and Window Sash

Color Description: White
Munsell Color Match: N9



Cabin 38: Chapman-Byers

Siding

Color Description: Dark green
Munsell Color Match: 10G 2/2



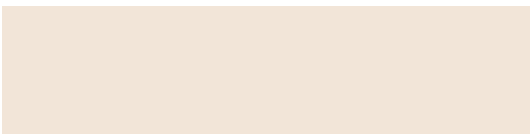
Sleeping Porch Framing

Color Description: Dark green
Munsell Color Match: 2.5BG 3/2



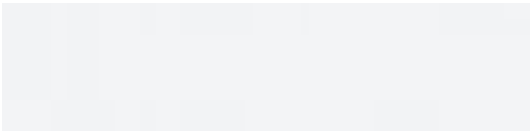
Door Surround

Color Description: White
Munsell Color Match: 10YR 9/1



Window Sash

Color Description: White
Munsell Color Match: N9



6.0 Bibliography

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The Jaeger Company, "Hale Cabin Historic Structure Report Draft," Great Smoky Mountains National Park, prepared for the National Park Service, 2016.

The Jaeger Company, "Scruggs-Briscoe Cabin Historic Structure Report Draft," Great Smoky Mountains National Park, prepared for the National Park Service, 2016.

APPENDIX A:

Key to Sample Locations

ELKMONT HISTORIC DISTRICT SAMPLE LIST

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 1 - SNEED			side windows have almost no paint - white only; horizontal log ends are finished beige, vertical are white			
ELK.1.1a	1	Sneed	west	Log wall, underside	traces of yellow	MLG
ELK.1.1b	1	Sneed	south	Log wall, under east window	traces of yellow	MLG
ELK.1.1c	1	Sneed	east	Log wall, under porch	traces of yellow	MLG
ELK.1.2	1	Sneed	East	front door, door surround, north side, top		MLG
ELK.1.3	1	Sneed	West	Log end, SW corner of building		MLG
ELK.1.4	1	Sneed	East	Window sill, under porch		MLG
CABIN 2 - SMITH			porch divided into 2 - currently, south side is red and north side is brown; both sides have mustard yellow sash, doors and trim; brown side looks like it has mostly been worn off with some blue left behind, a few areas have traces of brown paint on top; sash, trim, screen door look like they have dark green, blue, cream and current yellow; can see blue on edges of trim; door looks like it might have red underneath a blue, then cream and yellow; porch posts are dark green/light blue, cream, yellow; even bottoms of porches match the sides (red and brown); windows on red side have red sash - only one layer; exterior of porch looks like blue-green on lower siding and posts			
ELK.2.1	2	Smith	South	Siding, rear (SW) porch, under window	Blue over green	MLG
ELK.2.2	2	Smith	South	Siding, rear (SW) porch, west side of porch	Blue only; in this location, window surround is same color as siding	MLG
ELK.2.3	2	Smith	South	Floor, rear (SW) porch	Gray under orange, which is peeling	MLG
ELK.2.4	2	Smith	East	Siding (red side), under window	red side of building	MLG
ELK.2.5	2	Smith	East	Door surround, south door	looks to be same as window and screen door	MLG
ELK.2.6	2	Smith	East	Main door, middle rail, south door	looks similar to other door	MLG
ELK.2.7	2	Smith	East	Window sash, south window		MLG
ELK.2.8	2	Smith	South	Door, molding around lower E panel		MLG

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 3 - HIGDON			porch was replaced - floor, balusters, posts; windows may be salvaged			
ELK.3.1	3	Higdon	West	front door, N stile, at missing hardware	one piece missing upper layers	MLG
ELK.3.2	3	Higdon	West	front door, surround, rail at south side under light		MLG
ELK.3.3	3	Higdon	West	Wall batten at south side		MLG
ELK.3.4	3	Higdon	West	Siding at south side, adjacent to batten		MLG
ELK.3.5	3	Higdon	West	Window surround, north window		MLG
ELK.3.6	3	Higdon		Screen door	may have been exposed or clear coated - paint is flaking off to a sound wood surface	MLG
CABIN 5 - ADDICKS			currently all white with blue rear porch and underside of porch roof. Green porch floor			
ELK.5.1	5	Addicks	West	front elevation, northernmost section, "German" siding over door into room 101	paint looks the same here as on siding of southernmost and return along door to room 104	DSK
ELK.5.2	5	Addicks	West	front elevation, northernmost section, northernmost door into room 101, hinge stile		DSK
ELK.5.3	5	Addicks	west	front elevation, central section, window into room 103, upper sash, s. stile		DSK
ELK.5.4	5	Addicks	east	rear elevation, center, vertical board and batten siding (exterior of room 107) under siding below aluminum window, should repeat paint color on addition (c. 1970s)	board may have been salvaged from elsewhere and used, has more paint on it than the boards in this area	DSK
ELK.5.5	5	Addicks	west	front porch floor, taken near seam between sections of building		DSK

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 6 - CREEKMORE			currently medium green (all) with some white sash and white rear door			
ELK.6.1	6	Creekmore	east	front elevation, siding of original portion, from board just to the north of door into room 102	evidence of earlier blue and dark green. Blue-green on some porch framing as well. Siding of additional on front elevation only has current medium green paint.	DSK
ELK.6.2	6	Creekmore	East	front elevation, door into room 103, lock stile	1 sample removed from area behind door knob plate. Looks like it has only earliest (dark green) finish on it. This samples is for color matching.	DSK
ELK.6.3	6	Creekmore	east	front elevation, south window, upper sash, south stile		DSK
ELK.6.4	6	Creekmore	east	front elevation, south window, north surround		DSK
ELK.6.5	6	Creekmore	east	front elevation of last addition (on north side of building), from board of board and batten siding	addition is an enclosed porch, taken from area of exposed earlier (blue?) paint. Sample inside inner bag has this color exposed. Other sample is for casting. Color looks the same here as on siding of original portion on front elevation.	DSK
CABIN 7 - MAYO			currently white siding, sash, doors with green surrounds, porch and railing; one dark green rectangular part on rear addition (north elevation)			
ELK.7.1	7	Mayo	West	front elevation, board and batten siding, from a batten between door to rooms 101 mad 102		DSK
ELK.7.2	7	Mayo	west	front elevation, north window of room 102, lower sash, south stile	evidence of dark green and white on both north and south sash of front elevation	DSK
ELK.7.3	7	Mayo	west	front elevation, north window, south surround		DSK

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
ELK.7.4	7	Mayo	west	front elevation, siding, area of graffiti	sample will document pre-1950 color - graffiti dates paint on siding to before 1950	DSK
ELK.7.5	7	Mayo	east	rear elevation, "reverse board and batten siding" of enclosed porch addition, sample taken to north of door to room 103		DSK
CABIN 7A - LEVI TRENTAM LOG CABIN			upper windows of north elevation have no paint, just white glazing putty; no evidence of paint on timbers/logs on siding above			
ELK.7A.1	7A	Levi Trentham	east	rear elevation, south casement window, south sash (1932 remodeling)	only lower sash have paint - omit these samples if needed	DSK
CABIN 7B - MAYO SERVANTS' QUARTERS			currently all white (earlier green showing through on surrounds and corner boards			
ELK.7B.1	7B	Mayo Servants' Quarters	west	front elevation, board and batten siding between front door and window		DSK
ELK.7B.2	7B	Mayo Servants' Quarters	west	front elevation, front door, tongue and groove board near hinges		DSK
ELK.7B.3	7B	Mayo Servants' Quarters	west	front elevation, window surround, top		DSK
ELK.7B.4	7B	Mayo Servants' Quarters	east	rear elevation addition, board and batten siding, from board below window		DSK

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 8 - CAIN			all siding is green with blue underneath; at front and at some sides windows are all white, most have green underneath; at front porch, some balusters have green-blue under current white			
ELK.8.1	8	Cain	East	Siding at location of missing later paint, between two windows under porch		MLG
ELK.8.2	8	Cain	East	Batten, same area as 8.1	currently green, see blue-green underneath	MLG
ELK.8.3	8	Cain	East	Window surround, north window under porch, stile	currently while, can see green underneath	MLG
ELK.8.4	8	Cain	East	Window sash, north window, under porch, bottom rail of bottom sash		MLG
ELK.8.5	8	Cain	East	Front door under porch	currently sea foam green, can see red underneath, wood and paint in okay shape	MLG
ELK.8.6	8	Cain		Facing east, porch to back room at SW corner, rafter of porch roof	porch is believed to be 1970s addition - latest addition	MLG
ELK.8.7	8	Cain	South	Siding	porch is believed to be 1970s addition - latest addition	MLG
ELK.8.8	8	Cain		Ceiling, porch		MLG
ELK.8.9	8	Cain		Rafter, porch		MLG
CABIN 9 - GALYON			currently there is a combination of unpainted and dark red-brown siding with white and light yellow sash, white and yellow surrounds; very varied, underside of porch unpainted			
ELK.9.1	9	Galyon	West	front elevation, board of vertical siding	original part of building?	DSK
ELK.9.2		Galyon	West	Front elevation, north elevation of "bump out" at porch, batten of board and batten	added after siding of ELK 9.1	DSK
ELK.9.3		Galyon	South	board and batten siding, from a board with evidence of red paint	not sure when this part of the cabin dates from, but the boards and battens look similar to that where ELK 9.2 was taken from on front elevation	DSK

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
ELK.9.4		Galyon	West	front elevation, window sash, north sash, bottom rail		DSK
ELK.9.5		Galyon	West	front elevation, window surround, south surround		DSK
ELK.9.6		Galyon	West	Front elevation, door, rail, between bottom panel and 2nd from bottom panel		DSK
ELK.9.7		Galyon	West	Front elevation, front door surround, north surround at edge	area of earlier white paint (nameplate?) visible at top of surround	DSK
ELK.9.8		Galyon	West	Front elevation, porch floor at NY corner		DSK
CABIN 10 - BAUMANN			clerestory is white, rest is blue; porch has traces of blue; trim is white, front door is white; windows are dark green-blue; door, door surround and window all look the same			
ELK.10.1	10	Baumann		Siding, under porch		MLG
ELK.10.2	10	Baumann		Window trim		MLG
CABIN 11 - SCRUGGS- BRISCOE			front siding is blue-green, side siding is bright blue, back siding is blue-green; trim is white and windows are dark (possibly painted brown, or soiled)			
ELK.11.1	11	Scruggs-Briscoe	West	Window trim, north window under porch, right stile	looks like it used to have screens that have been removed	MLG
ELK.11.2	11	Scruggs-Briscoe	West	Siding of house, under porch		MLG
ELK.11.3	11	Scruggs-Briscoe		Rafter, porch ceiling		MLG
ELK.11.4	11	Scruggs-Briscoe	West	Screen door, hinge stile, under porch		MLG
ELK.11.5	11	Scruggs-Briscoe	West	Front door, rail		MLG
ELK.11.6	11	Scruggs-Briscoe		Window sash, bottom rail, south window on porch		MLG

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 13 - COOK			siding and trim are blue-green; window sash are white, door is white; appears as if porch posts are replacement, and most of floor has been replaced - part of floor is painted gray (1 layer) similar to the other porch floor			
ELK.13.1	13	Cook	West	Window sash, south sash, left side	top layer is separated	MLG
ELK.13.2	13	Cook	West	Window surround		MLG
ELK.13.3	13	Cook		Door, lock stile, at edge of former lock		MLG
ELK.13.4	13	Cook	West	Siding, under porch		MLG
ELK.13.5	13	Cook		Screen door, lock stile		MLG
ELK.13.6	13	Cook		Porch floor		MLG
CABIN 15 - HALE			currently dark green siding (front), blue siding (back and sides) with white trim, sash and doors			
ELK.15.1	15	Hale	West	Front elevation, batten of board and batten siding at south end of elevation		DSK
ELK.15.2	15	Hale		Interior room, original (?)/earlier exposed south wall of cabin, board and batten siding	looks like it has same green as on current exterior siding of front element plus another green that is in part of this room	DSK
ELK.15.3	15	Hale	South	Addition/porch enclosure at east end, beaded tongue and groove siding	also has a dark green under current blue	DSK
ELK.15.4	15	Hale	West	Front elevation, south door, middle rail at hinge stile		DSK
ELK.15.5	15	Hale	West	Front elevation, south double hung window, upper sash, bottom rail		DSK
ELK.15.6	15	Hale	West	Front elevation, south window, south surround		DSK

Sample No.	Cabin No.	Cabin Name	Elevation	Location	Notes	Sample by
CABIN 38 - CHAPMAN-BYERS						
ELK.38.1	38	Chapman-Byers	East	Sleeping porch at second floor on east elevation, west wall of porch (former east exterior wall), wall below former window	sleeping porch thought to be an addition	DSK
ELK.38.2	38	Chapman-Byers	East	Sleeping porch, NE post at second floor		DSK
ELK.38.3	38	Chapman-Byers	East	first floor level, front door, surround, panel under south side light		DSK
ELK.38.4	38	Chapman-Byers	East	South window, sash, bottom rail of bottom sash		DSK
ELK.38.5	38	Chapman-Byers		South side of porch, siding at batten	has light green, blue and dark green layers	DSK

APPENDIX B:
Stratigraphy Sheets

Finishes Analysis



Figure 1: Sample location

SAMPLE NO: ELK.I.Ic

CABIN: Sneed

LOCATION: East elevation, log wall, under porch

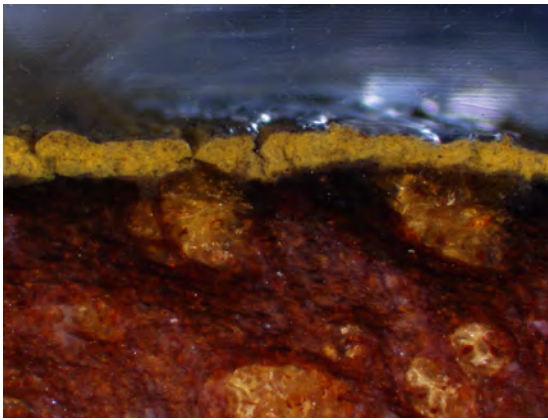


Figure 2: Reflected Light, 40x

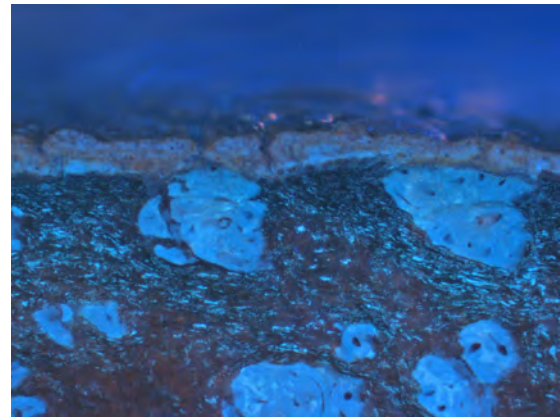


Figure 3: UV Light, 40x

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Elkmont National Historic District Cabins

Finishes Analysis



Figure 4: Sample location

SAMPLE NO: ELK.1.2

CABIN: Sneed

LOCATION: East elevation, front door, door surround, north side, top

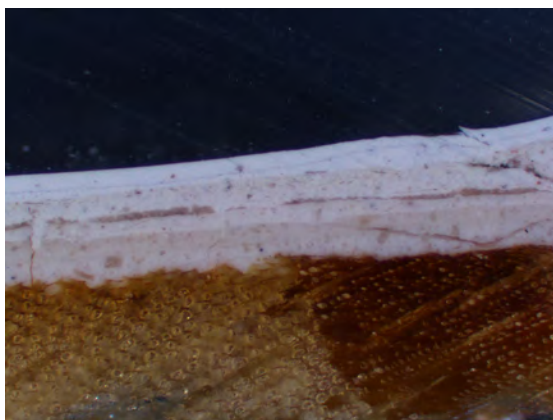


Figure 5: Reflected Light, 40x

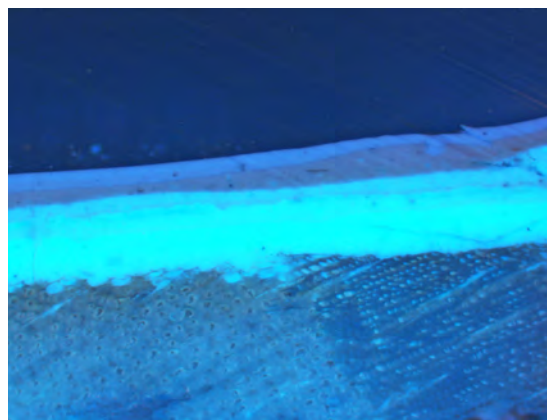


Figure 6: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Off White	bright	paint in pores of wood
dirt			
2	Off White	bright	uneven surface
dirt/	separation?		
3	White/off white	grayish	
4	White/off white	grayish	
5	White	reddish	uneven
6	White	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 7: Sample location

SAMPLE NO: ELK.I.4
CABIN: Sneed
LOCATION: East elevation, window sill, under porch

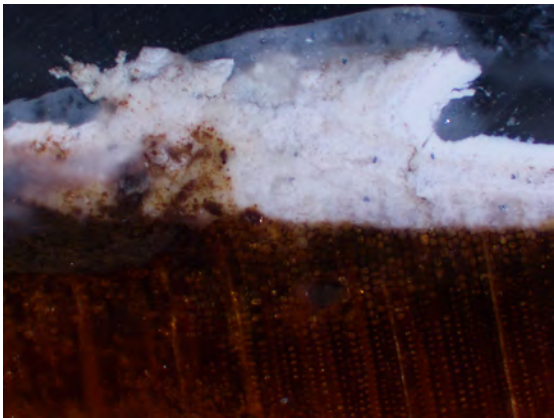


Figure 8: Reflected Light, 40x

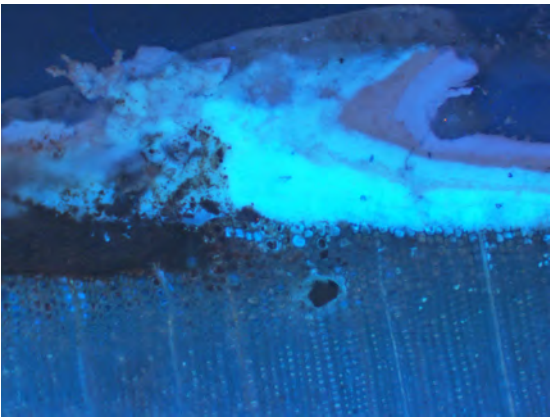


Figure 9: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Brown	none	in pores; partial
2	Off white	bright	
3	Off white	bright	
4	Off white	gray	
5	White	reddish	
6	White	gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 10: Sample location

SAMPLE NO: ELK.2.1
CABIN: Smith
LOCATION: South elevation, siding, rear (SW) porch, under window

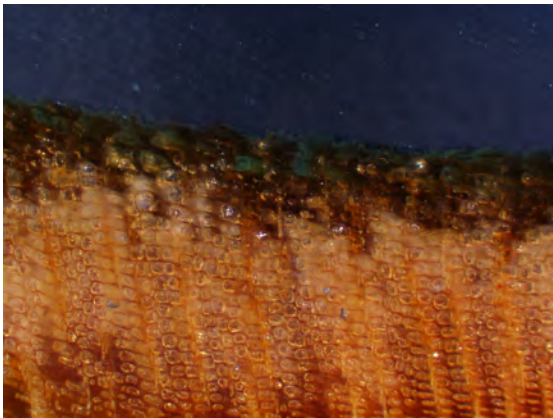


Figure 11: Reflected Light, 40x

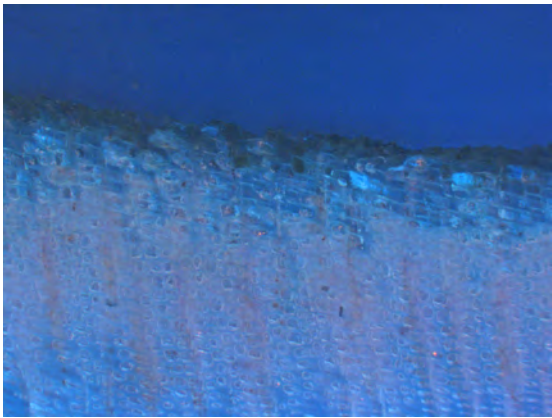


Figure 12: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven - worn/stripped
1	Brown	blue	saturation in pores
2	Green	dark	seeped into pores

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 13

SAMPLE NO: ELK.2.4
CABIN: Smith
LOCATION: East elevation, siding (red side),
under window

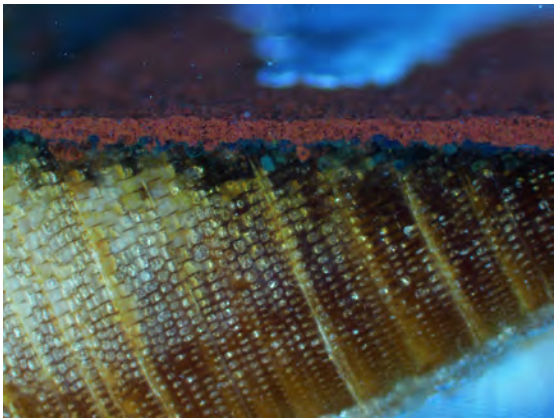


Figure 14: Reflected Light, 40x

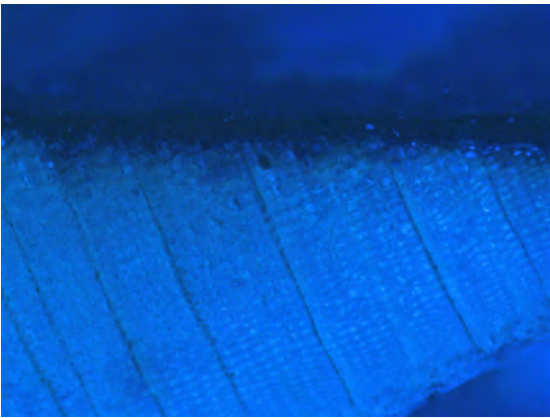


Figure 15: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven - darkened
1	Green/Blue	none	traces mixed in wood pores
2	Red-brown	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 16

SAMPLE NO: ELK.2.5
CABIN: Smith
LOCATION: East elevation, door surround,
south door

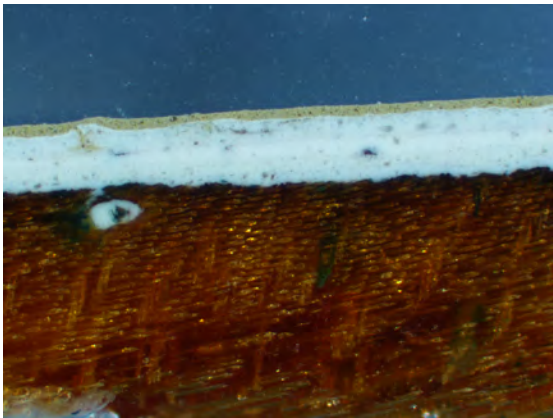


Figure 17: Reflected Light, 40x

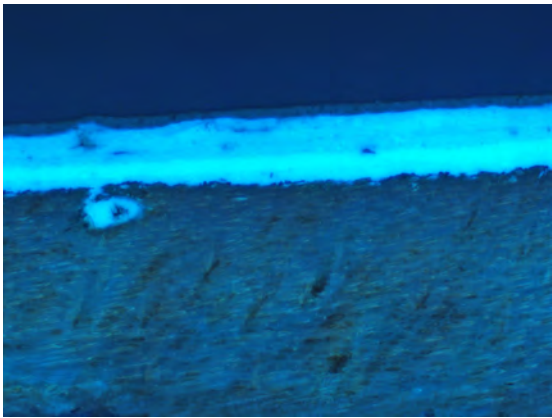


Figure 18: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven - darkened
1	Green	blue	in pores only
2	Off white	bright	
3	Off white	blue	
4	White	grayish	
dirt			
5	off white	grayish	cracked
dirt			
6	off white	grayish	cracked
7	white?		very thin; cracked
8	yellow green		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 19

SAMPLE NO: ELK.2.6

CABIN: Smith

LOCATION: East elevation, main door, middle rail, south door

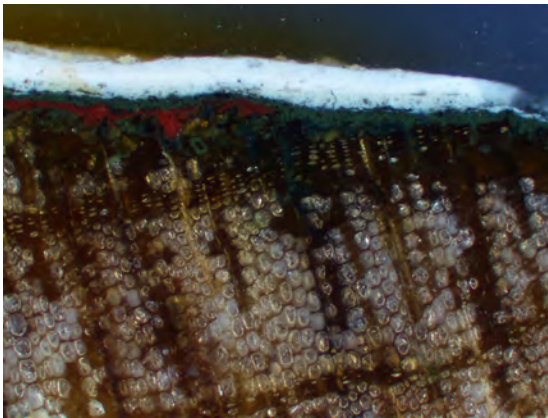


Figure 20: Reflected Light, 40x

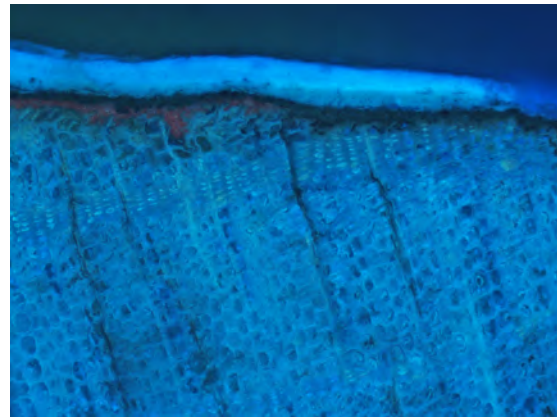


Figure 2I: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			
1	dark green		in pores - leakdown from above?
2	red		partial
3	dark green	dark	
dirt/	worn		
4	off white	gray	
dirt			
5	white	bright	partial
6	white	gray	
7	off white	gray	
8	yellow		leaked down to green

[illegible]

Elkmont National Historic District Cabins

Finishes Analysis



Figure 22

SAMPLE NO: ELK.2.7

CABIN: Smith

LOCATION: East elevation, window sash, south window

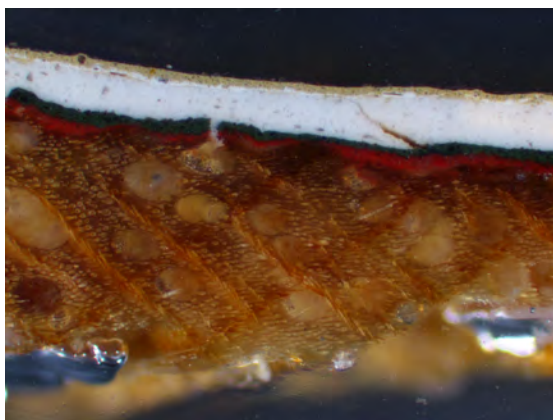


Figure 23: Reflected Light, 40x

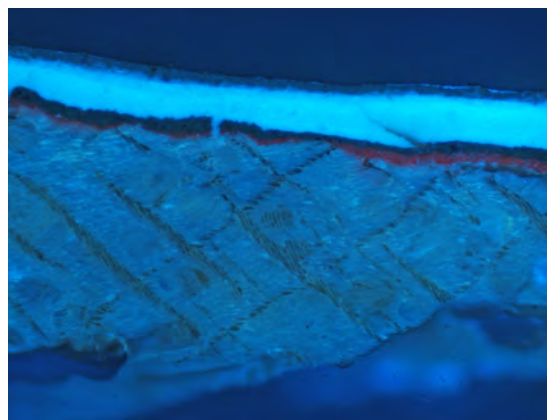


Figure 24: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			
1	Green	none	traces in wood
2	Red	none	cracked
3	Green	none	cracked/worn surface
4	Off white	bright blue	
5	White	blue	very thin
6	Yellow	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 25

SAMPLE NO: ELK.2.8
CABIN: Smith
LOCATION: South elevation, door, molding
around lower east panel



Figure 26: Reflected Light, 40x

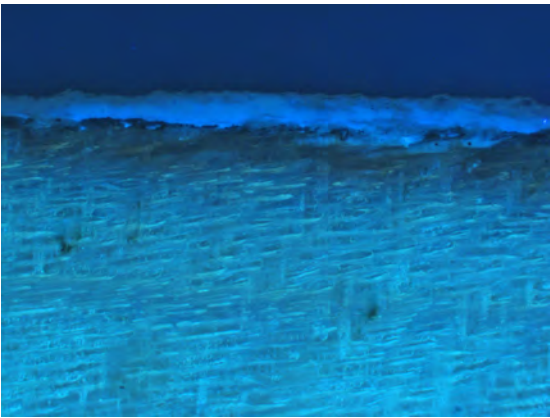


Figure 27: UV Light, 40x

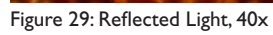
LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven/dark surface
1	Green	dark	traces in wood
2	White	blue	discolored at surface

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



LOCATION: West elevation, front door, north
stile, near hardware

[illegible]

Elkmont National Historic District Cabins

Finishes Analysis



Figure 31

SAMPLE NO: ELK.3.2

CABIN: Higdon

LOCATION: West elevation, front door, surround, rail at south side under light

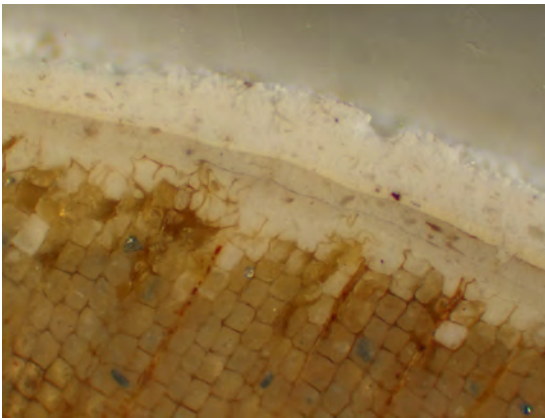


Figure 32: Reflected Light, 40x

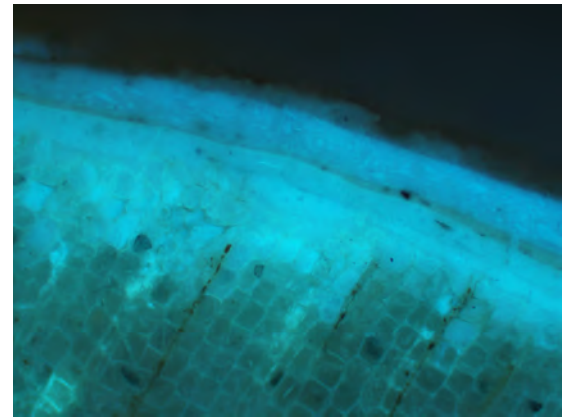


Figure 33: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven surface
1	White/off white	blue	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 34

SAMPLE NO: ELK.3.4

CABIN: Higdon

LOCATION: West elevation, siding at south side, adjacent to batten

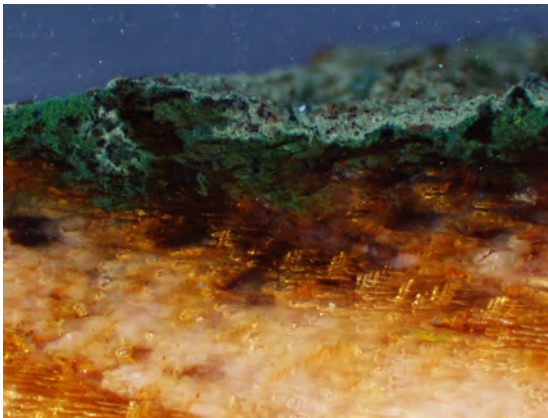


Figure 35: Reflected Light, 40x

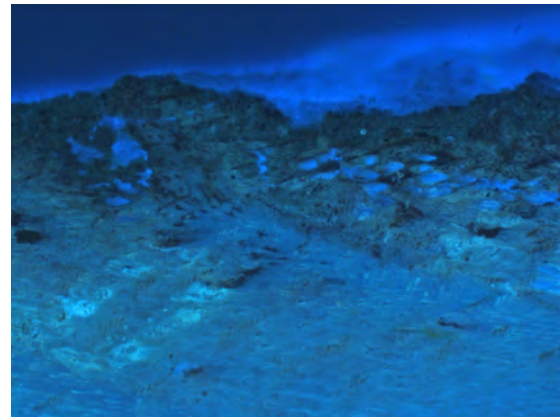


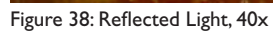
Figure 36: UV Light, 40x

[illegible][illegible]

Finishes Analysis



LOCATION: West elevation, window surround, north window

[illegible][illegible]

Finishes Analysis



Figure 40

SAMPLE NO: ELK.3.6

CABIN: Higdon

LOCATION: West elevation, screen door

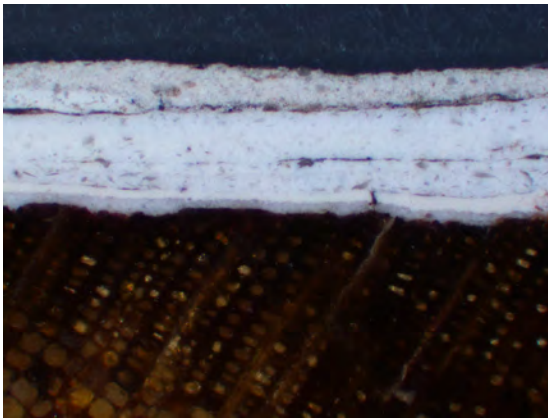


Figure 4I: Reflected Light, 100x

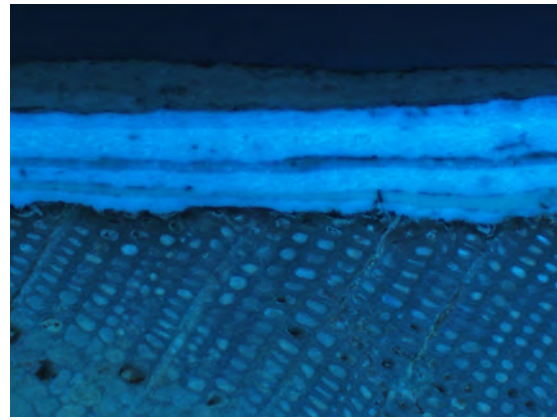


Figure 42: UV Light, 100x

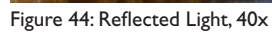
LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Off white	blue	thin
2	White/crm	grayish	thin
dirt			
3	White	blue	
4	White	gray	
dirt			thick
5	White		
6	White		
dirt			thick
7	White		partial
8	Gray		

[illegible]

Finishes Analysis



LOCATION: West elevation, front, northernmost section, "German" siding over door into room 101



LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	White	blue	traces in wood
2	Translucent gray	blue	
3	White	gray	thin
4	Off white	blue	
5	Off white	blue	
6	Green		chunk - not continuous layer
dirt			
7	White	grayish	
dirt			
8	White	grayish	

[illegible]

Elkmont National Historic District Cabins

Finishes Analysis



Figure 46

SAMPLE NO: ELK.5.2

CABIN: Addicks

LOCATION: West elevation, front, northernmost section,, northernmost door into room 101, hinge stile

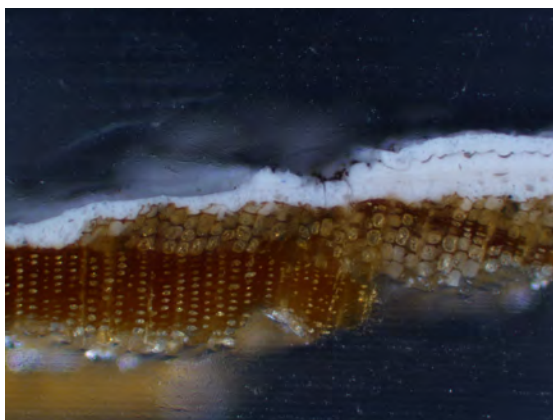


Figure 47: Reflected Light, 40x

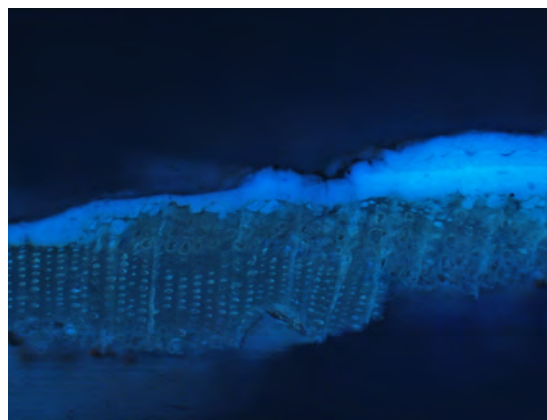


Figure 48: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, soiled?
1	Off White	blue	
dirt			
2	White	grayish	
dirt			
3	Off White	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 49

SAMPLE NO:ELK.5.3

CABIN: Addicks

LOCATION: West elevation, front, central section, window into room 103, upper sash, south stile

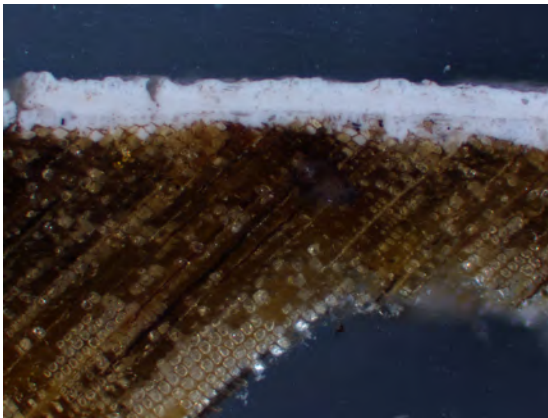


Figure 50: Reflected Light, 40x

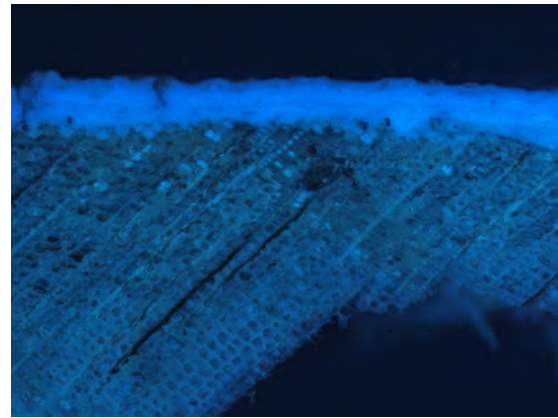


Figure 5 I: UV Light, 40x

[illegible][illegible]

Elkmont National Historic District Cabins

Finishes Analysis



Figure 52

SAMPLE NO: ELK.5.4

CABIN: Addicks

LOCATION: East (rear) elevation, center, vertical board and batten siding (exterior of room 107), under aluminum window

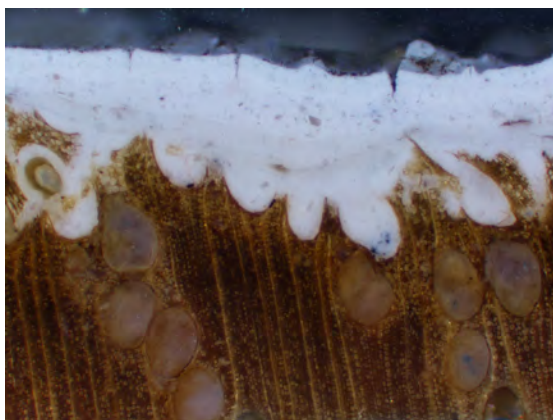


Figure 53: Reflected Light, 40x

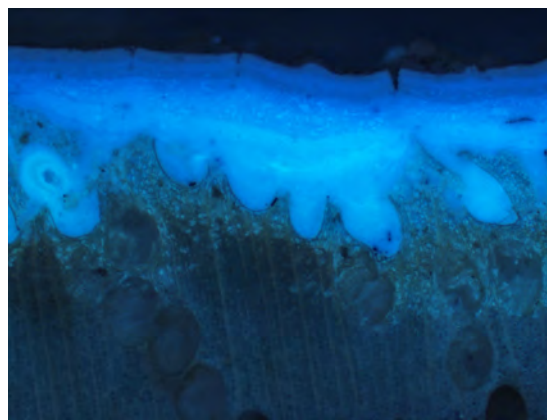


Figure 54: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven; soiled surface?
1	off white	blue	in pores
2	off white	bright blue	
3	White	blue	
4	White	grayish	
5	White	grayish	
6	White	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 55

SAMPLE NO: ELK.5.5
CABIN: Addicks
LOCATION: West elevation, front porch floor,
taken near seam between sections of building

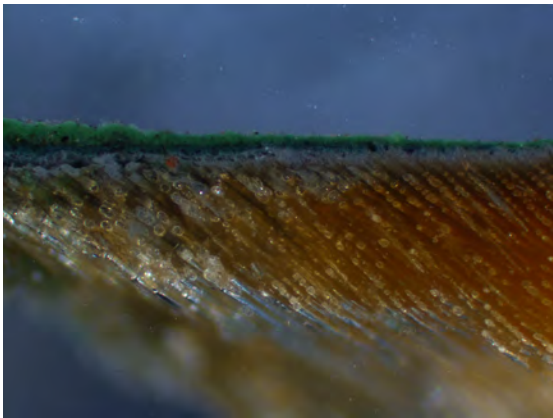


Figure 56: Reflected Light, 40x

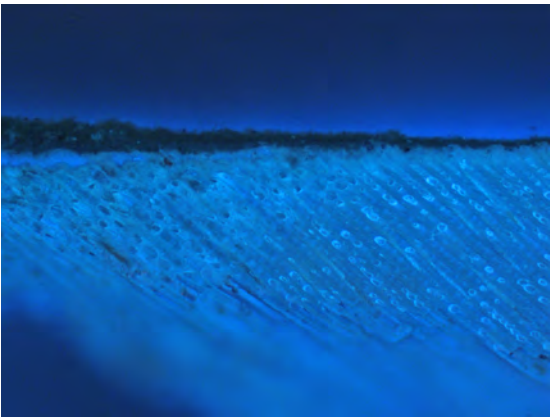


Figure 57: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			rough
1	Brown/Green	blue	traces, in wood
2	Gray green	none	
dirt			
3	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 58

SAMPLE NO: ELK.6.1

CABIN: Creekmore

LOCATION: East elevation, front elevation, siding of original portion, front board just to the north of door into room 102

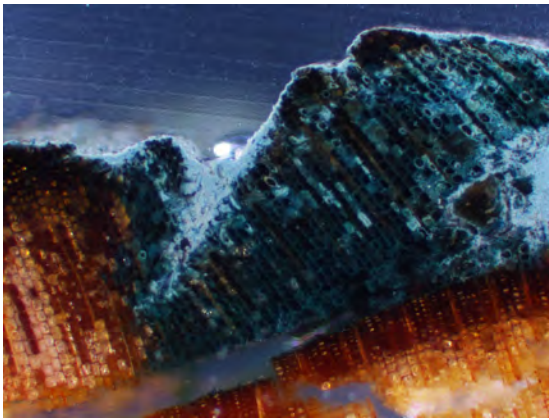


Figure 59: Reflected Light, 40x

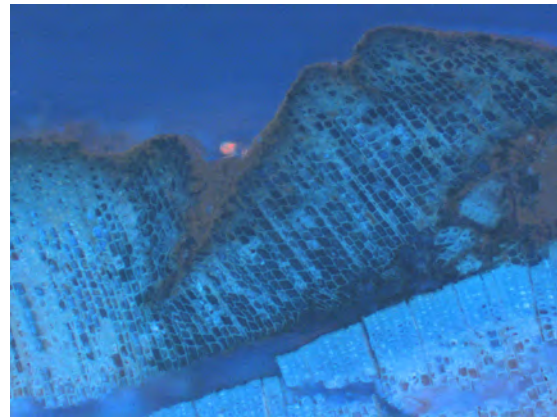


Figure 60: UV Light, 40x

[illegible][illegible]



Figure 61

SAMPLE NO: ELK.6.3
CABIN: Creekmore
LOCATION: East elevation, front elevation,
south window, upper sash, south stile

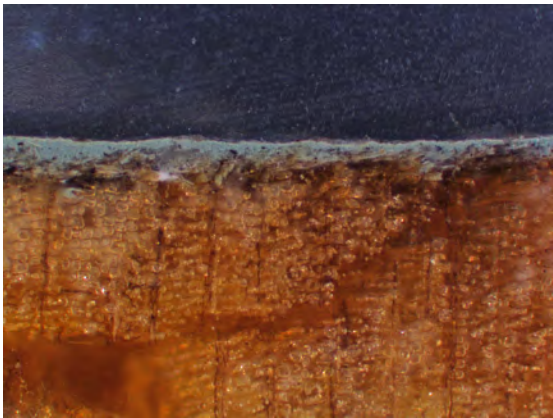


Figure 62: Reflected Light, 40x

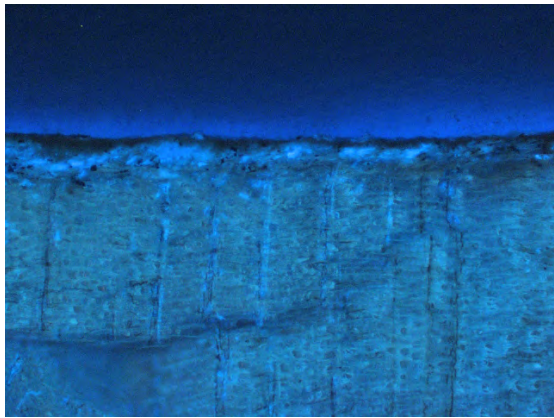


Figure 63: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven surface
1	Gray/Trans	blue	uneven, in pores
2	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 64

SAMPLE NO: ELK.6.4

CABIN: Creekmore

LOCATION: East elevation, front elevation,
south window, north surround

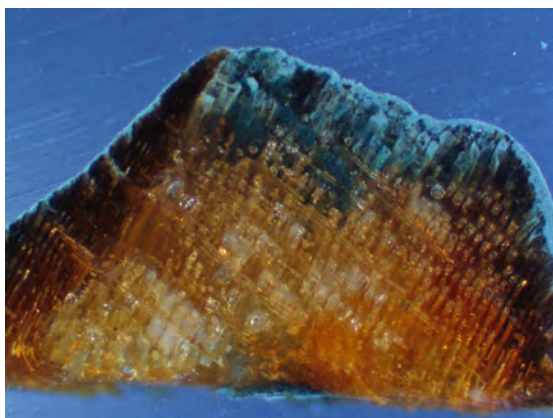


Figure 65: Reflected Light, 40x

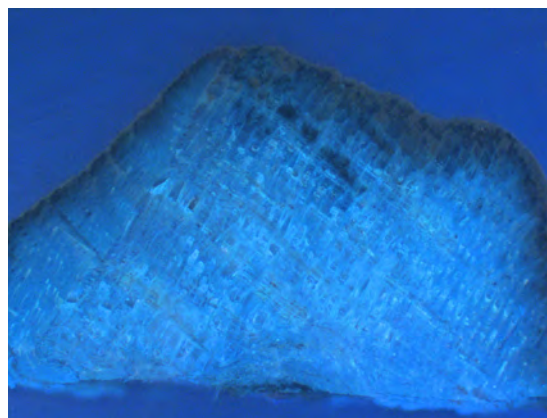


Figure 66: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Dark green		traces, in pores
2	Green	none	thin

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 67

SAMPLE NO: ELK.6.5

CABIN: Creekmore

LOCATION: East elevation, front elevation of last addition (on north side of building), from board of board and batten siding

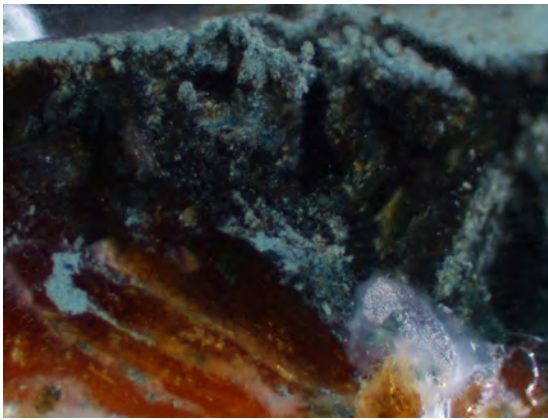


Figure 68: Reflected Light, 40x

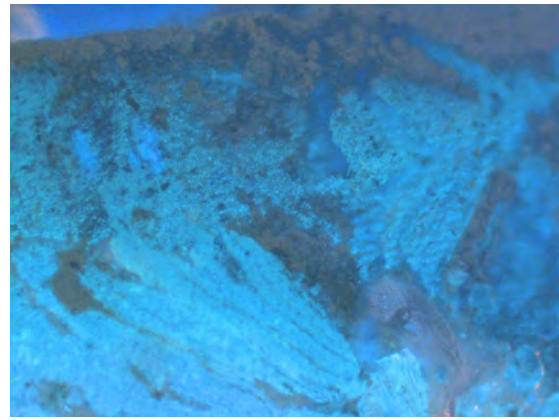


Figure 69: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Dark green		traces, in pores
2	Green		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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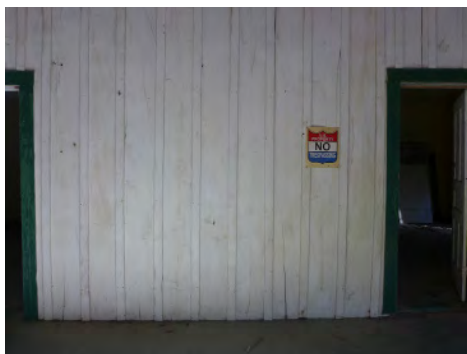


Figure 70

SAMPLE NO: ELK.7.1

CABIN: Mayo

LOCATION: West (front) elevation, board and batten siding, from a batten between door to rooms 101 and 102

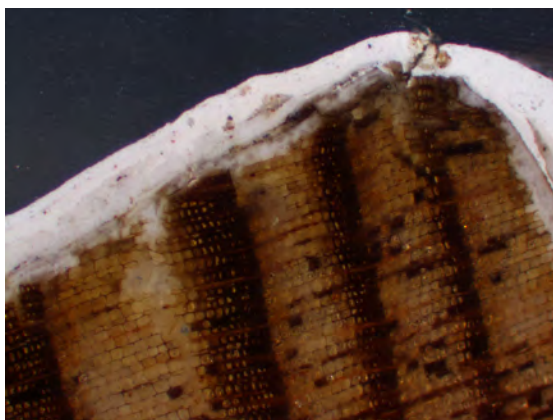


Figure 71: Reflected Light, 40x

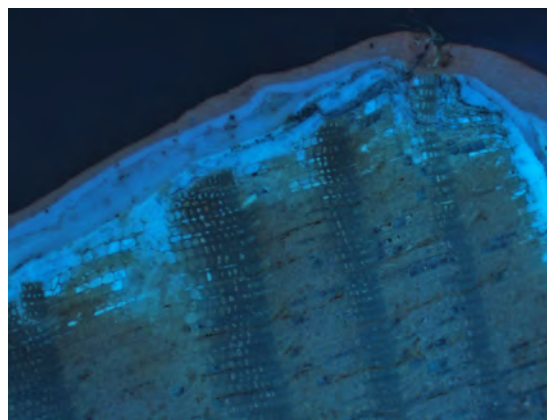


Figure 72: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Off white	blue	in pores
dirt			
2	Translucent gray	blue	
dirt			
3	Off white	grayish	
dirt			
4	White	grayish	
dirt			
5	White	dark gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 72

SAMPLE NO: ELK.7.2

CABIN: Mayo

LOCATION: West (front) elevation, north window of room 102, lower sash, south stile

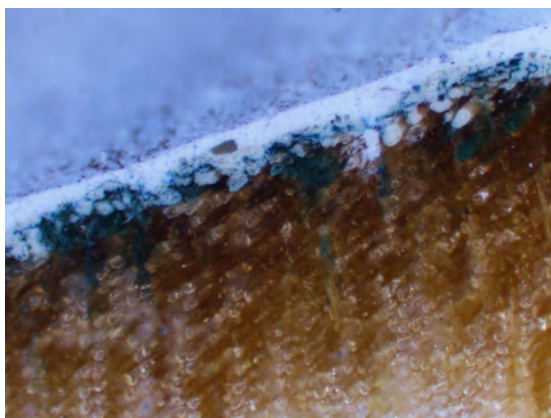


Figure 73: Reflected Light, 40x

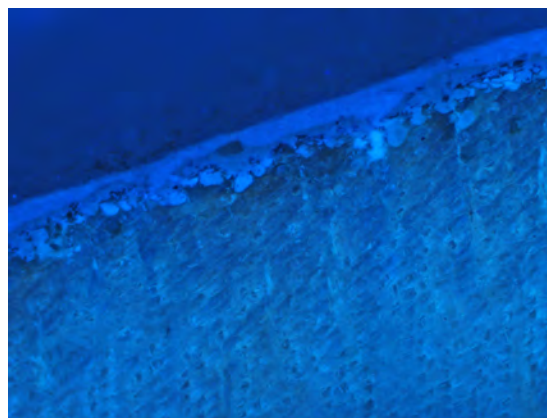


Figure 74: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	White?	blue	traces, in pores
2	Light blue	gray	thin, partial
3	White	gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 75

SAMPLE NO: ELK.7.3

CABIN: Mayo

LOCATION: West (front) elevation, north window, south surround

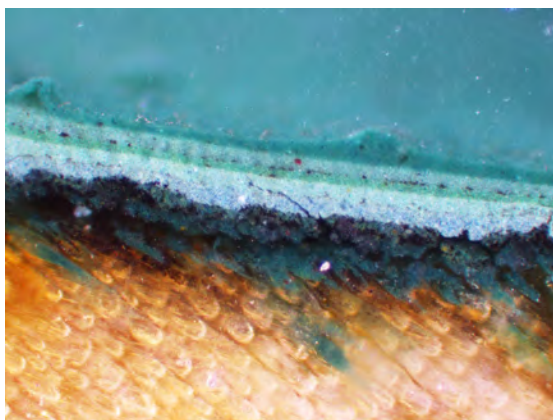


Figure 76: Reflected Light, 100x



Figure 77: UV Light, 100x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface, paint separated
1	Green	none	traces, in pores
2	Brown?	blue	
3	Green	none	
4	Light blue	grayish	
5	Light green	grayish	
6	Bright green	grayish	
7	Green	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

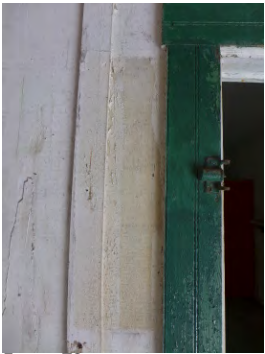


Figure 78

SAMPLE NO: ELK.7.4
CABIN: Mayo
LOCATION: West (front) elevation, siding,
area of graffiti, which dates paint to before 1950

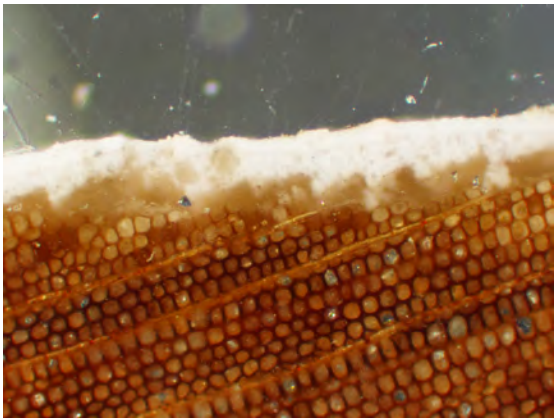


Figure 79: Reflected Light, 100x

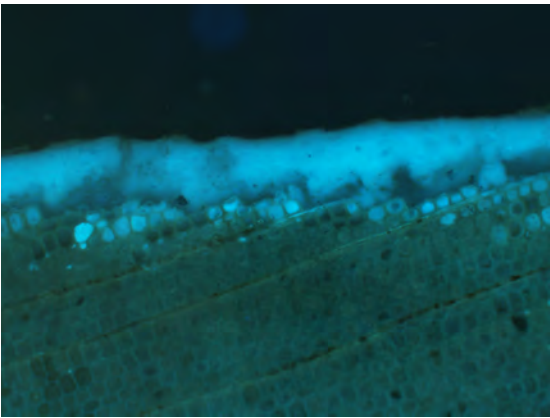


Figure 80: UV Light, 100x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, separated
1	white		looks broken at wood surface

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 81

SAMPLE NO:ELK.7.5

CABIN: Mayo

LOCATION: East (rear) elevation, reverse board and batten siding of enclosed porch addition, from north of door to room 103

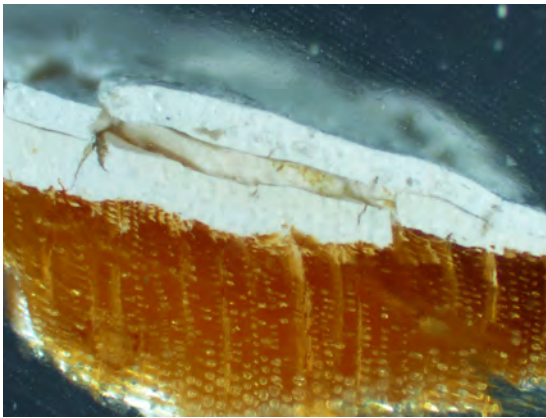


Figure 82: Reflected Light, 40x

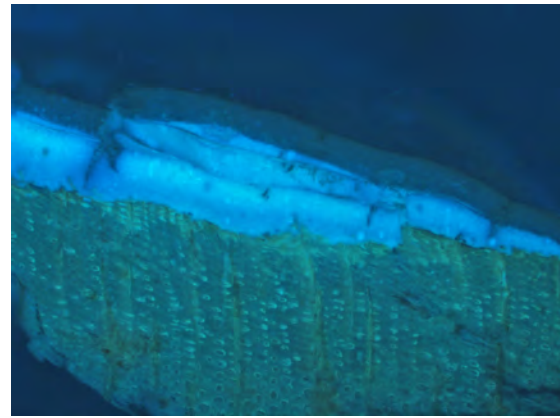


Figure 83: UV Light, 40x

[illegible][illegible]

Finishes Analysis



Figure 84

SAMPLE NO: ELK.7B.1

CABIN: Mayo Servants' Quarters

LOCATION: West (front) elevation, board and batten siding between front door and window

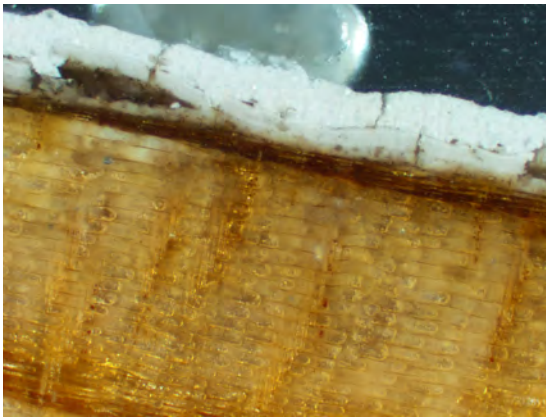


Figure 85: Reflected Light, 40x

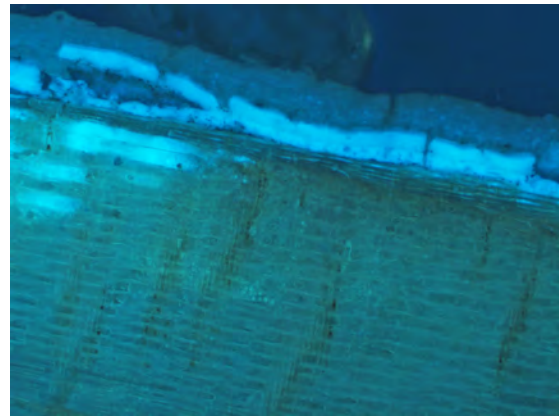


Figure 86: UV Light, 40x

[illegible][illegible]

Finishes Analysis



Figure 87

SAMPLE NO: ELK.7B.2

CABIN: Mayo Servants' Quarters

LOCATION: West (front) elevation, front door, tongue and groove board near hinges

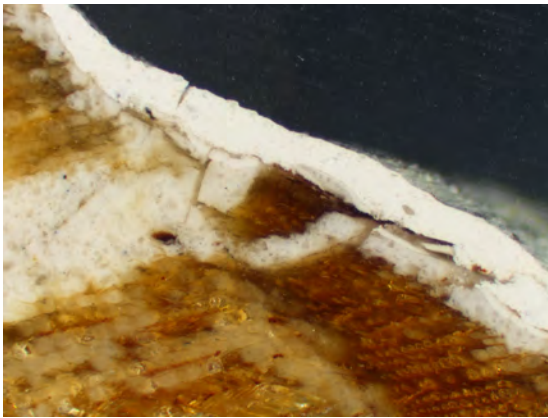


Figure 88: Reflected Light, 40x

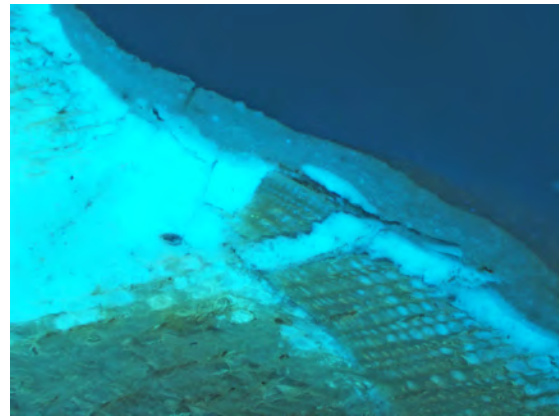


Figure 89: UV Light, 40x

[illegible][illegible]



Figure 90

SAMPLE NO: ELK.7B.3
CABIN: Mayo Servants' Quarters
LOCATION: West (front) elevation, window surround, top

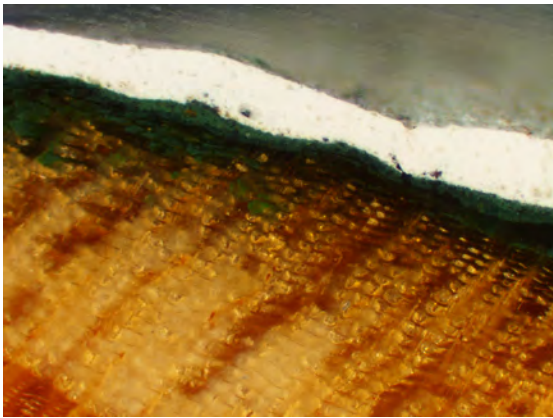


Figure 91: Reflected Light, 40x

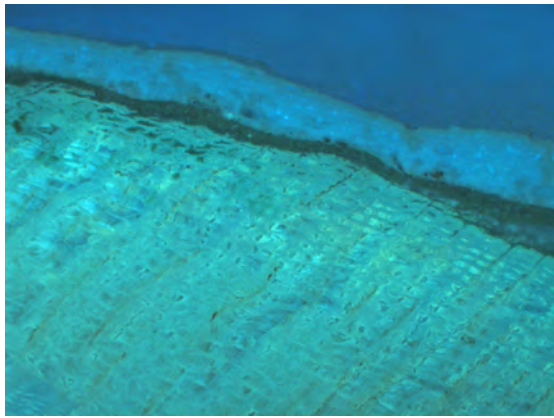


Figure 92: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			dark surface
1	dark green		traces, in pores
2	dark green		
dirt			
3	White	dark/gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 93

SAMPLE NO: ELK.7B.4

CABIN: Mayo Servants' Quarters

LOCATION: East (rear) elevation addition, board and batten siding, from board below window

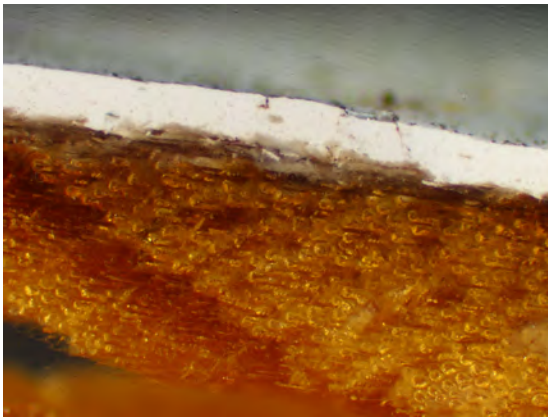


Figure 94: Reflected Light, 40x

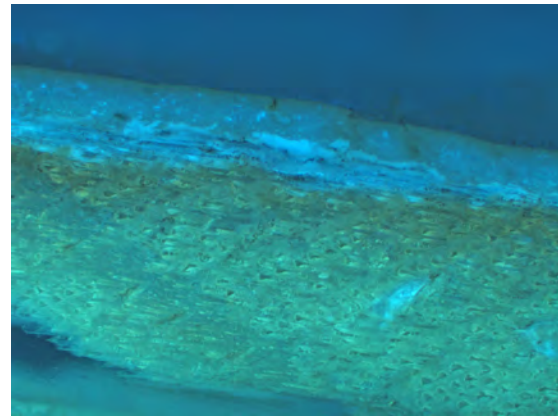


Figure 95: UV Light, 40x

[illegible][illegible]

Finishes Analysis



Figure 96

SAMPLE NO: ELK.8.1

CABIN: Cain

LOCATION: East elevation, siding at location of missing later paint, between two windows under porch

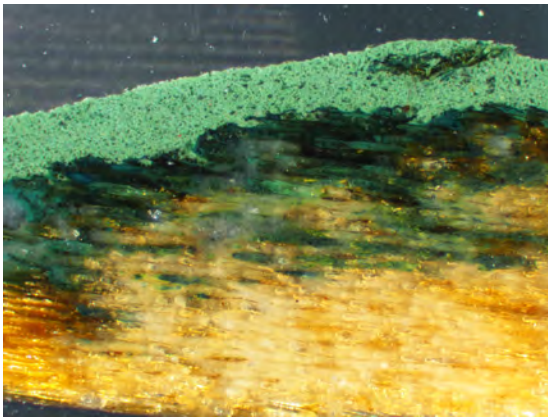


Figure 97: Reflected Light, 40x

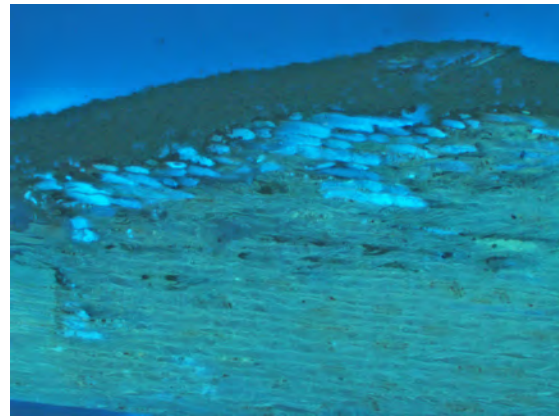


Figure 98: UV Light, 40x

[illegible][illegible]



Figure 99

SAMPLE NO: ELK.8.3
CABIN: Cain
LOCATION: East elevation, window surround, north window under porch, stile

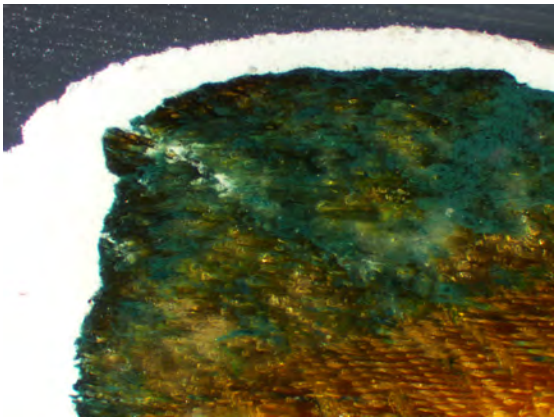


Figure 100: Reflected Light, 40x

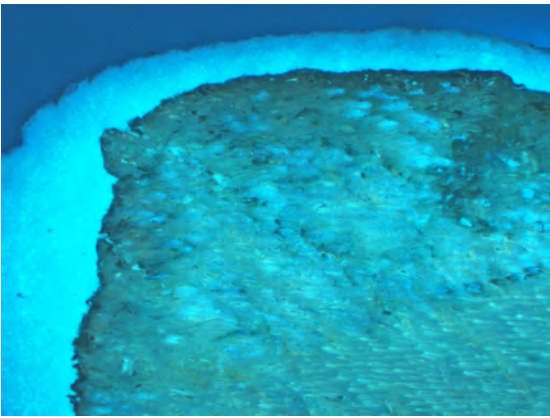


Figure 101: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Dark green		in pores
2	Brown?	blue	in pores, not continuous
dirt/	discoloration		
3	White	bright blue	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 102

SAMPLE NO: ELK.8.4

CABIN: Cain

LOCATION: East elevation, window sash, north window, under porch, bottom rail of bottom sash

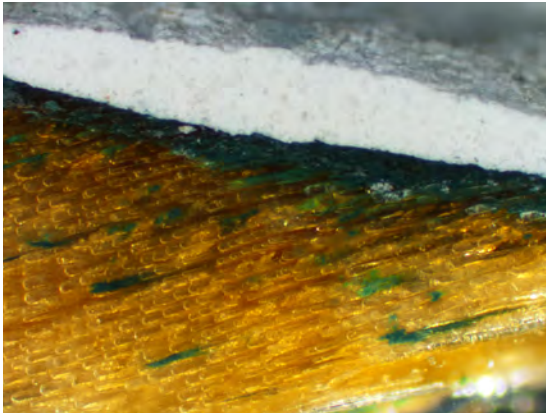


Figure 103: Reflected Light, 40x

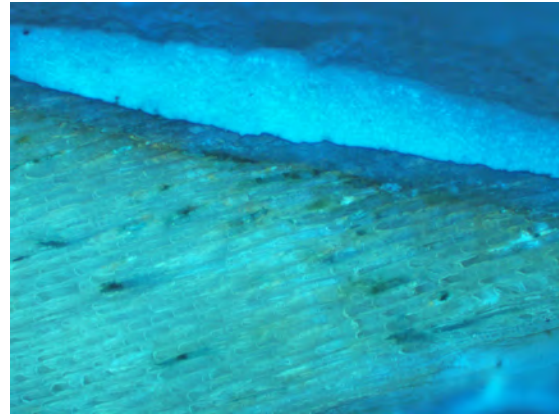


Figure 104: UV Light, 40x

[illegible][illegible]

Finishes Analysis



Figure 105

SAMPLE NO: ELK.8.5

CABIN: Cain

LOCATION: East elevation, front door, under porch

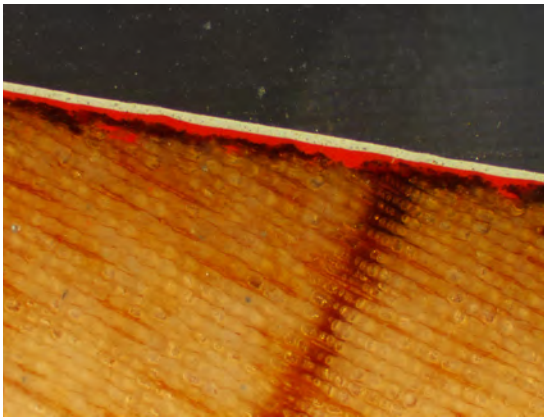


Figure 106: Reflected Light, 40x

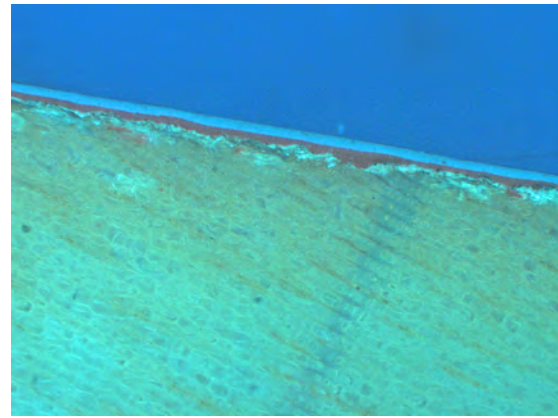


Figure 107: UV Light, 40x

[illegible][illegible]



Figure 108

SAMPLE NO: ELK.8.6
CABIN: Cain
LOCATION: Facing east, porch to back room
at SW corner, rafter of porch roof

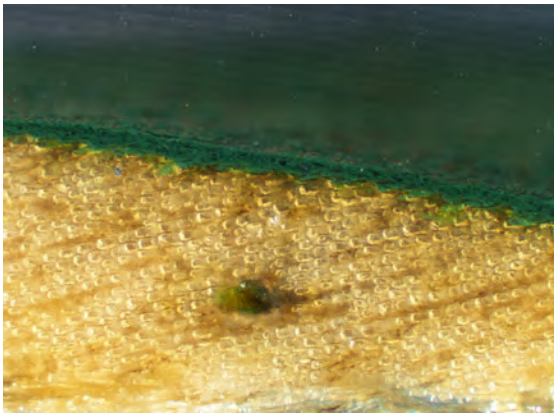


Figure 109: Reflected Light, 40x

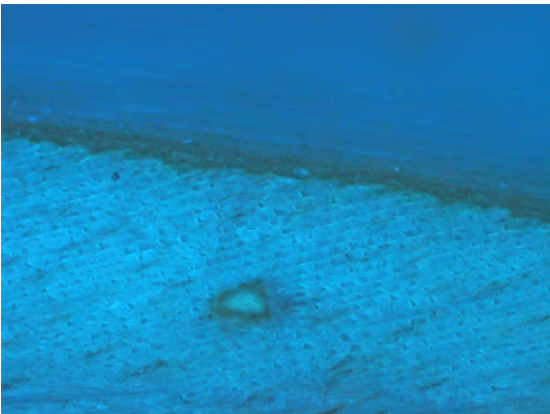


Figure 110:UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Dark green	none	in pores

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

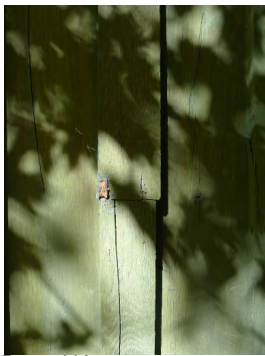


Figure 111

SAMPLE NO: ELK.8.7
CABIN: Cain
LOCATION: South elevation, siding

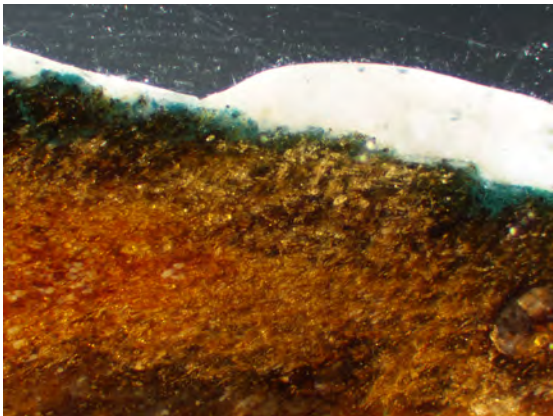


Figure 112: Reflected Light, 40x

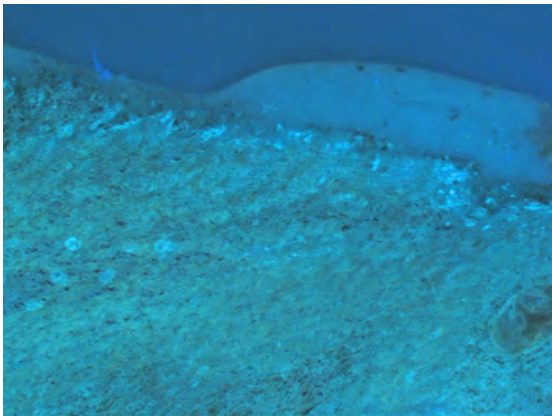


Figure 113: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, damaged, dark
1	Brown?	Blue	traces, in pores
2	Dark green	none	damaged
3	White	gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 114

SAMPLE NO: ELK.8.9
CABIN: Cain
LOCATION: Rafter, porch

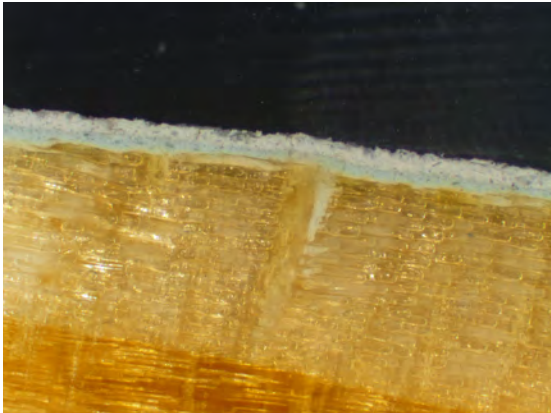


Figure 115: Reflected Light, 40x

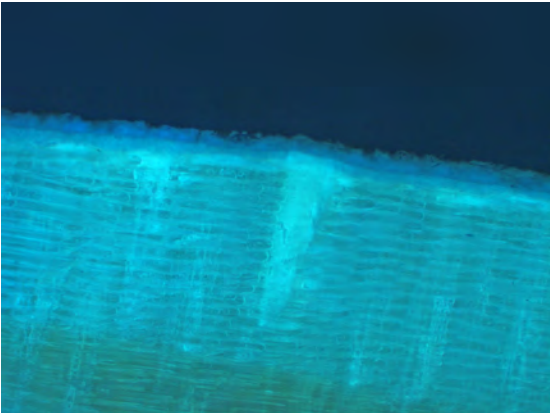


Figure 116: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			
1	White	bright blue	traces
2	Light blue	grayish	
3	White	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Figure 117

SAMPLE NO: ELK.9.1

CABIN: Galyon

LOCATION: West (front) elevation, board of vertical siding

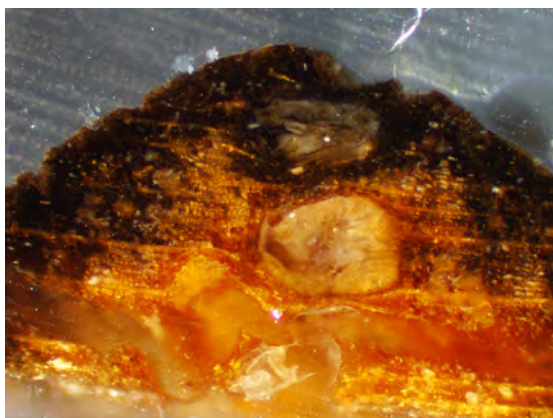


Figure 118: Reflected Light, 40x



Figure 119: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark, saturated surface
1	Brown	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 120

SAMPLE NO: ELK.9.2

CABIN: Galyon

LOCATION: West (front) elevation, north elevation of “bumpout” at porch, batten of board and batten

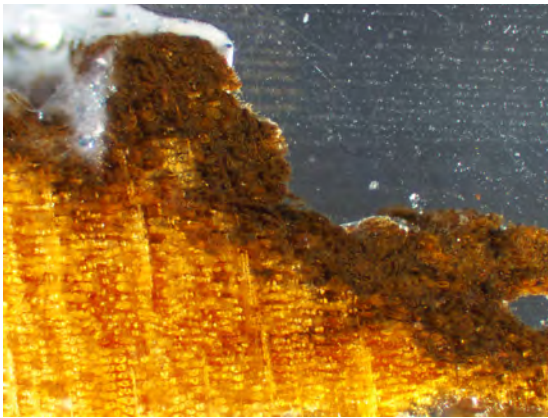


Figure 121: Reflected Light, 40x

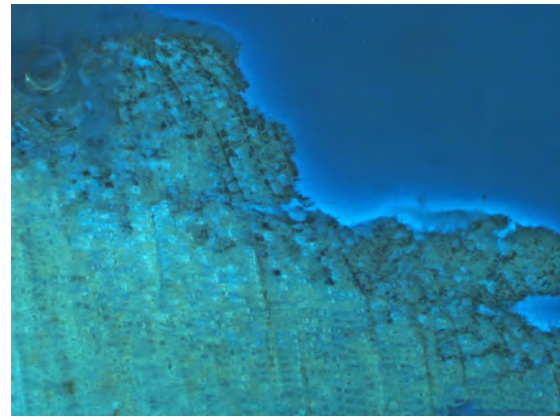


Figure 122: UV Light, 40x

[illegible][illegible]

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Figure 123

SAMPLE NO: ELK.9.3

CABIN: Galyon

LOCATION: South elevation, board and batten siding, from a board with evidence of red paint

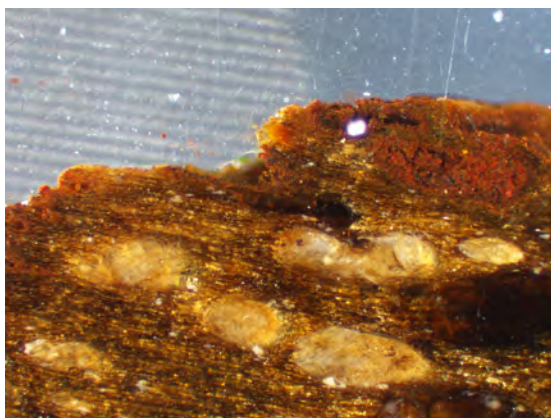


Figure 124: Reflected Light, 40x

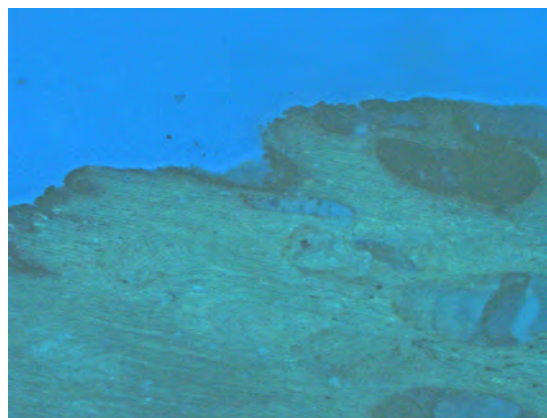


Figure 125: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Reddish brown	none	damaged

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 126

SAMPLE NO: ELK.9.4
CABIN: Galyon
LOCATION: West (front) elevation, window sash, north sash, bottom rail

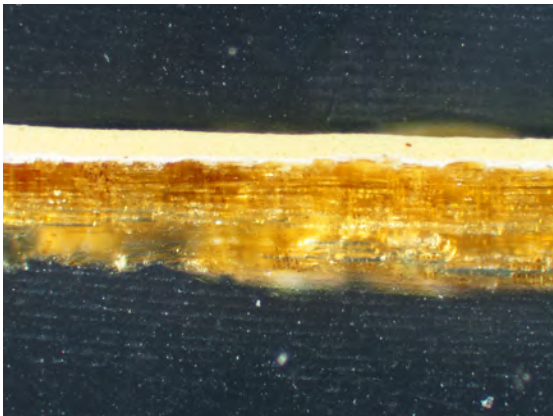


Figure 127: Reflected Light, 40x

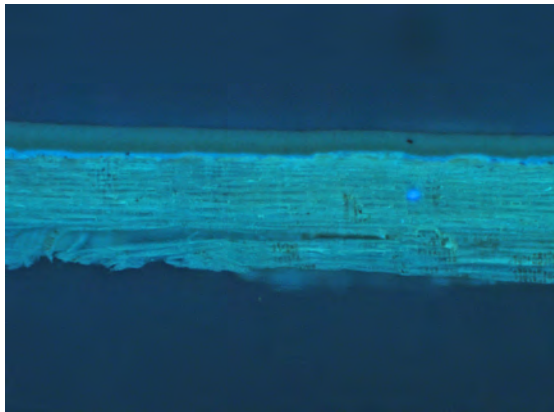


Figure 128: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	White	blue	very thin
2	Yellow	gray	
3	Yellow	grayish	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 129

SAMPLE NO:ELK.9.5

CABIN: Galyon

LOCATION: West (front) elevation, window surround, south surround

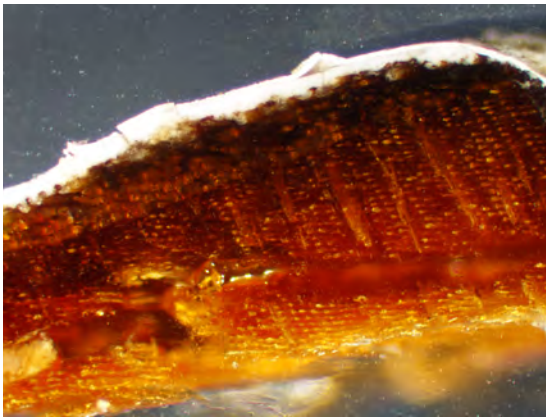


Figure I 30: Reflected Light, 40x

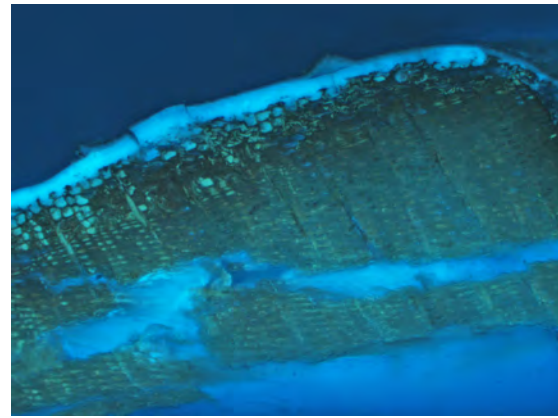


Figure 131: UV Light, 40x

[illegible][illegible]

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Figure 132

SAMPLE NO: ELK.9.6

CABIN: Galyon

LOCATION: West (front) elevation, front door, rail, between bottom panel and 2nd from bottom panel

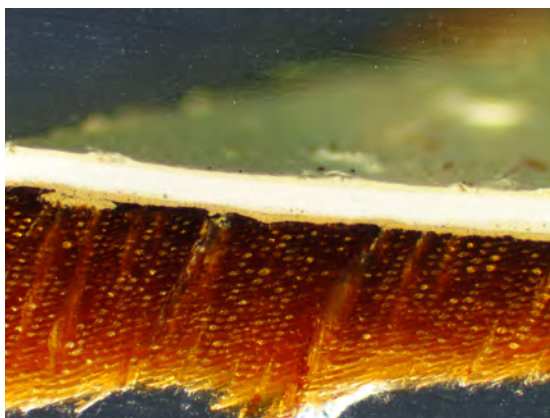


Figure 133: Reflected Light, 40x

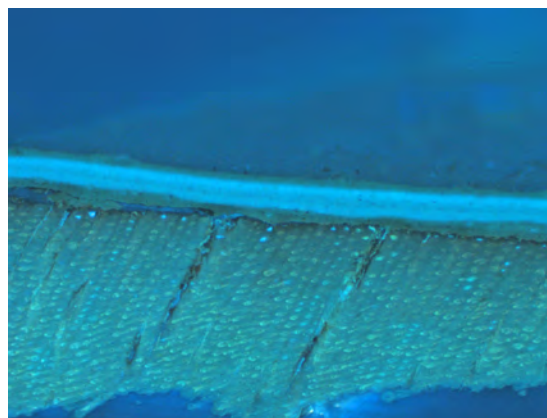


Figure 134: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			Uneven, dark surface
1	Yellow	gray	
2	Off white		
3	White		
4	White		
5	White		
6	Yellow/cream	gray	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 135

SAMPLE NO: ELK.9.7
CABIN: Galyon
LOCATION: West (front) elevation, front door surround, north surround at edge

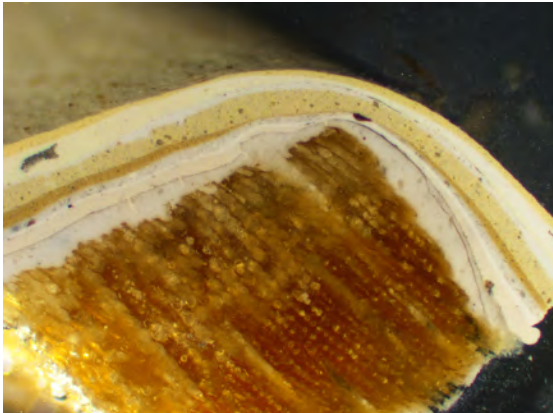


Figure 136: Reflected Light, 40x

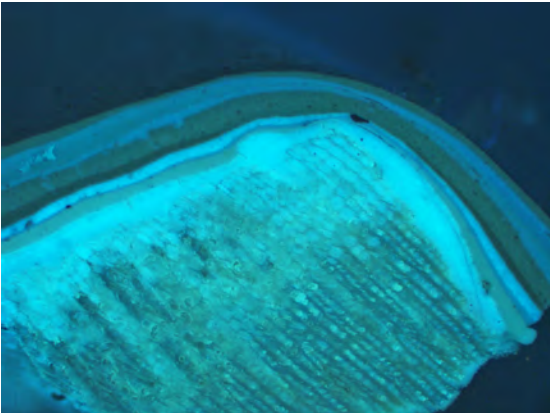
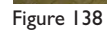


Figure 137: UV Light, 40x

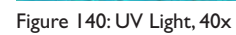
LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	White		soaked into pores
dirt			
2	White		partial
dirt			
3	Cream		
4	White		thin
5	Off white		
6	Yellow-tan		
7	yellow		
8	white		
dirt			
9	light yellow		
10	yellow		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



LOCATION: Siding, under porch

[illegible][illegible]

Elkmont National Historic District Cabins

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Figure 141

SAMPLE NO: ELK.10.2

CABIN: Baumann

LOCATION: Window trim

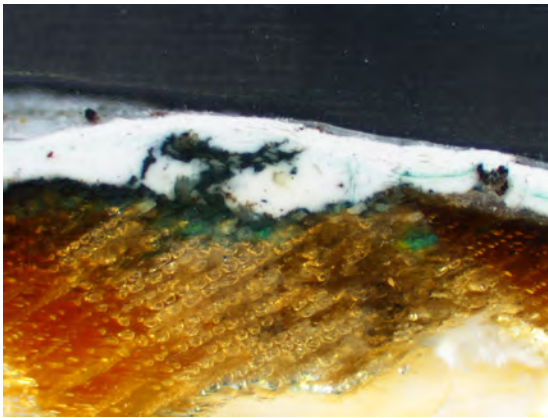


Figure 142: Reflected Light, 40x

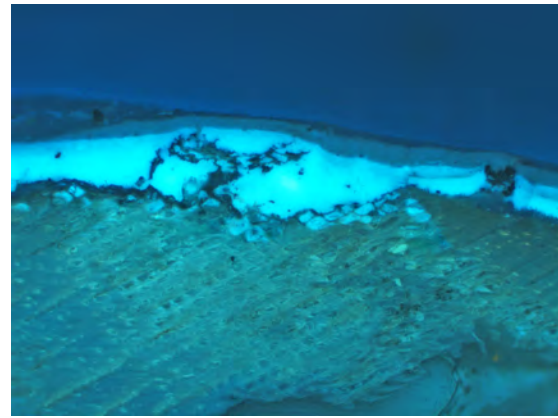


Figure 143: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Green?	blue?	
2	Dark green	none	
3	White		traces of green within
4	White		
5	White		
6	Light gray		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 144

SAMPLE NO: ELK.11.1

CABIN: Scruggs-Briscoe

LOCATION: West elevation, window trim,
north window under porch right stile

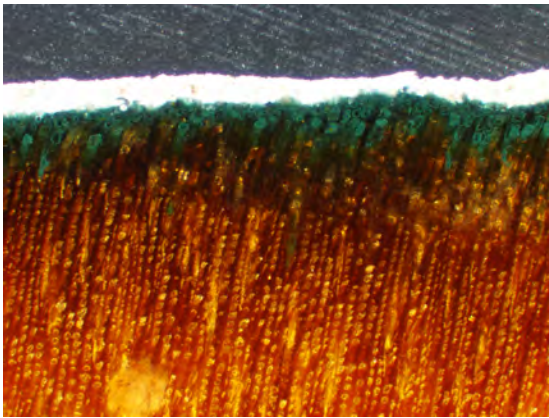


Figure 145: Reflected Light, 40x

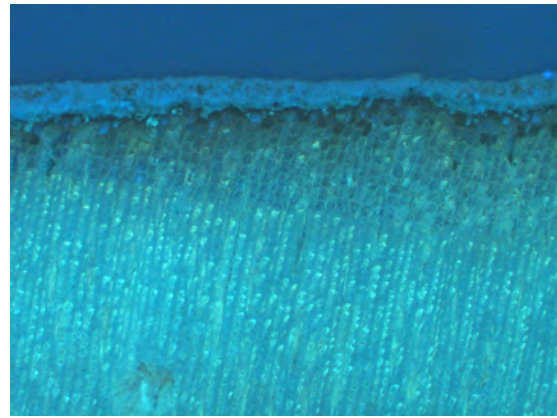


Figure 146: UV Light, 40x

[illegible][illegible]



Figure 147

SAMPLE NO: ELK.11.2
CABIN: Scruggs-Briscoe
LOCATION: West elevation, siding of house, under porch

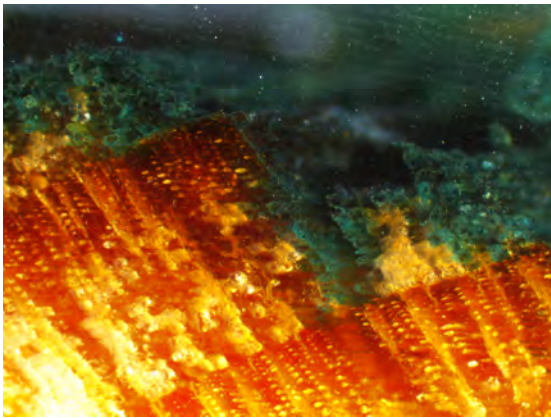


Figure 148: Reflected Light, 40x

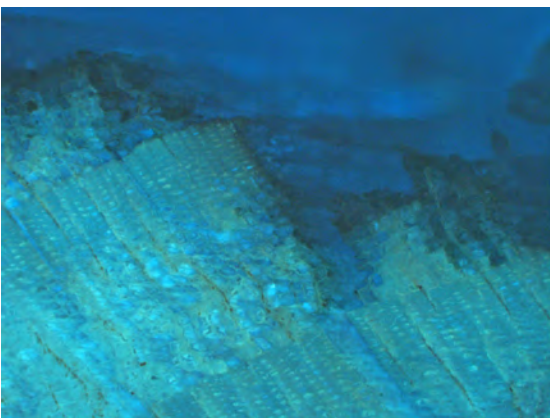


Figure 149: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Dark green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 150

SAMPLE NO: ELK.11.3
CABIN: Scruggs-Briscoe
LOCATION: Rafter, porch ceiling

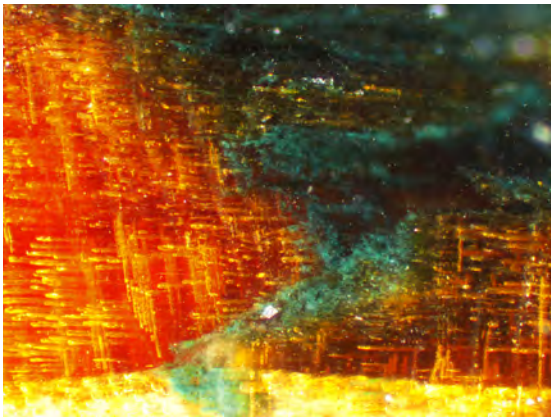


Figure 151: Reflected Light, 40x

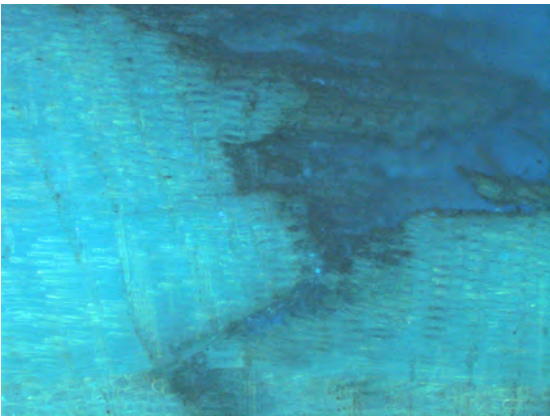


Figure 152: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark
1	Dark green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Elkmont National Historic District Cabins

Finishes Analysis



Figure 153

SAMPLE NO: ELK.11.4

CABIN: Scruggs-Briscoe

LOCATION: West elevation, screen door, hinge stile, under porch

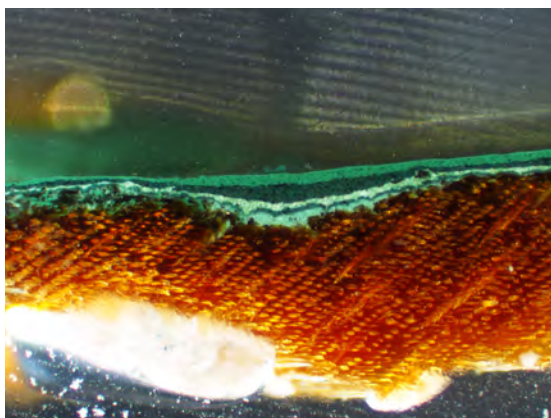


Figure 154: Reflected Light, 40x

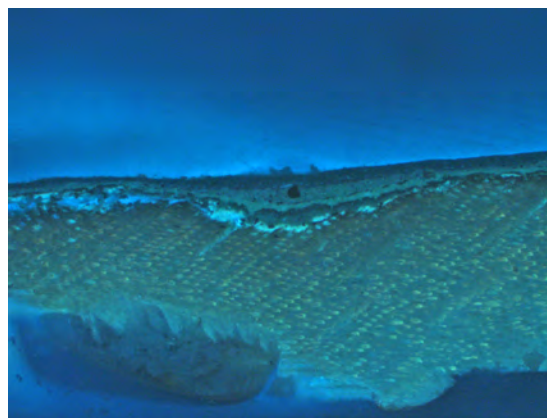


Figure 155: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Brown?	bright blue-green	partial, damaged?
2	Light green		
3	Green		
4	White		
dirt			
5	Dark green		
6	Green		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 156

SAMPLE NO: ELK.11.5
CABIN: Scruggs-Briscoe
LOCATION: West elevation, front door, rail

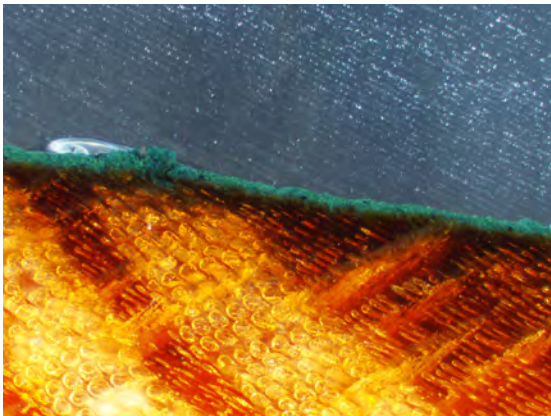


Figure 157: Reflected Light, 40x

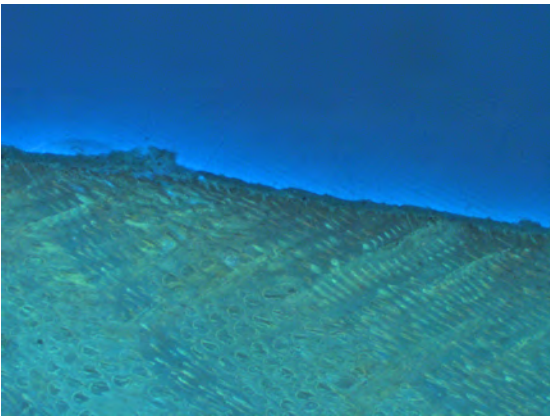


Figure 158: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, darkened surface
1	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 159

SAMPLE NO: ELK.11.6
CABIN: Scruggs-Briscoe
LOCATION: Window sash, bottom rail, south window on porch

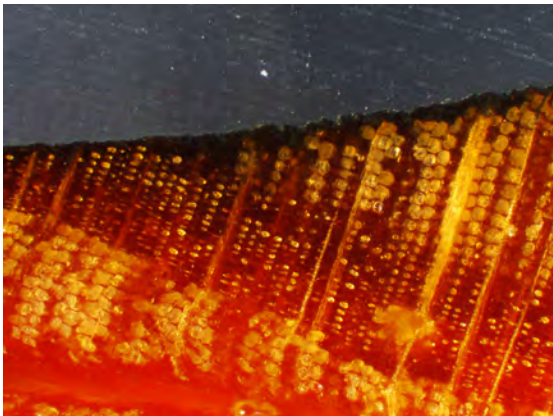


Figure 160: Reflected Light, 40x

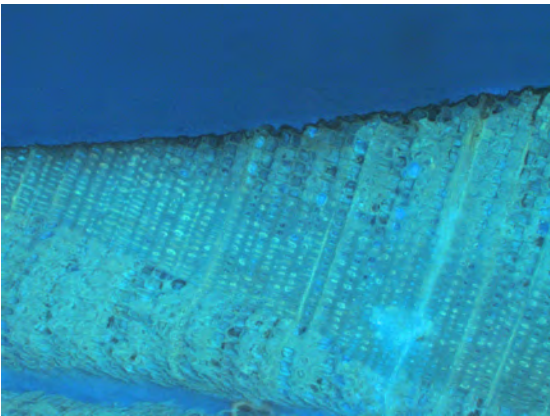


Figure 161: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Brown	none	very thin

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 162

SAMPLE NO: ELK.13.1
CABIN: Cook
LOCATION: West elevation, window sash
south sash, left side

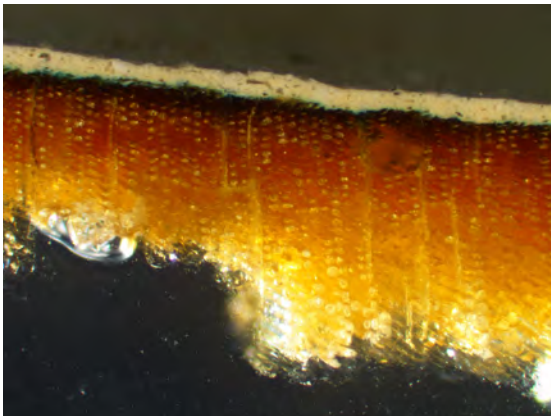


Figure 163: Reflected Light, 40x

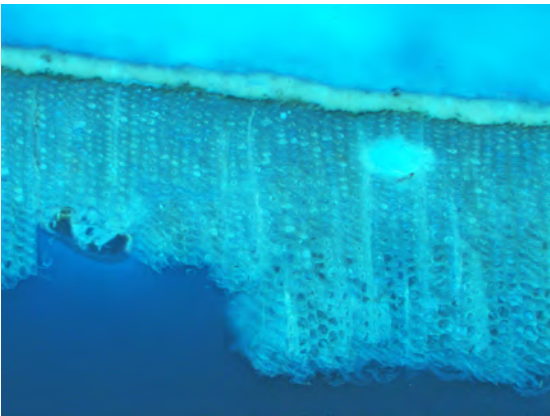


Figure 164: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			soiled surface?
1	Green		in pores
2	Yellow		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 165

SAMPLE NO: ELK.13.2

CABIN: Cook

LOCATION: West elevation, window surround

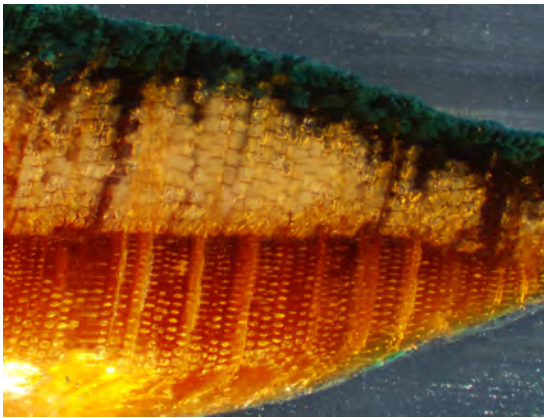


Figure 166: Reflected Light, 40x

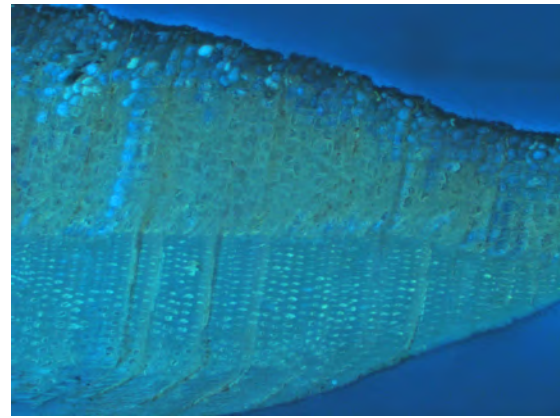


Figure 167: UV Light, 40x

[illegible][illegible]

Elkmont National Historic District Cabins

Finishes Analysis



Figure 168

SAMPLE NO: ELK.13.3

CABIN: Cook

LOCATION: Door, lock stile, at edge of former lock

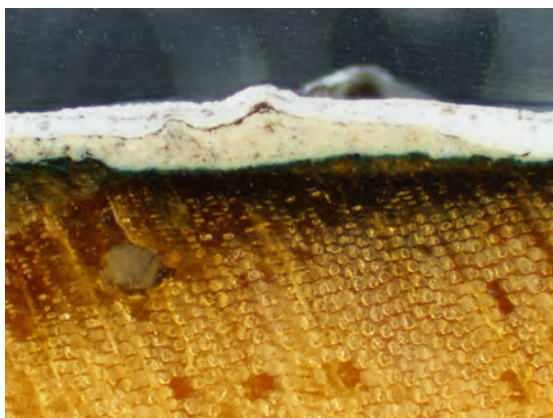


Figure 169: Reflected Light, 40x

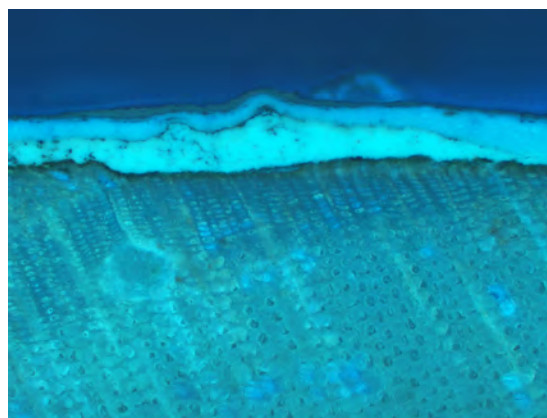


Figure 170: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			dark surface, soiled?
1	Green	none	thin
2	Yellow/crm		
dirt			
3	White		
dirt			
4	White		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 171

SAMPLE NO: ELK.13.4
CABIN: Cook
LOCATION: West elevation, siding, under porch

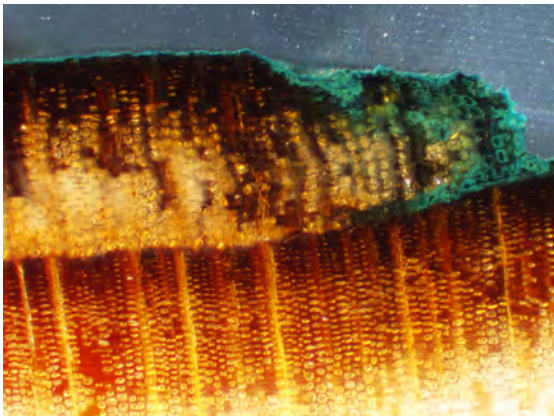


Figure 172: Reflected Light, 40x

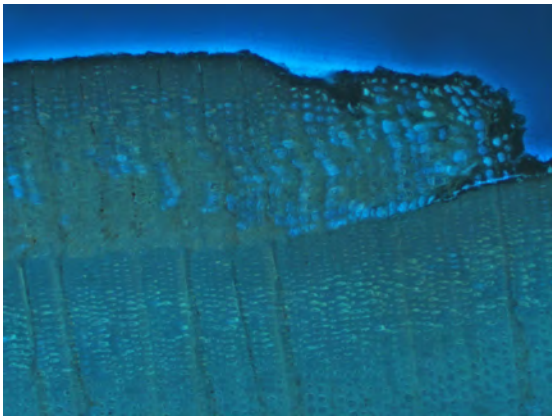


Figure 173: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Brown?	blue	in pores
2	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 174

SAMPLE NO: ELK.13.5
CABIN: Cook
LOCATION: Screen door, lock stile

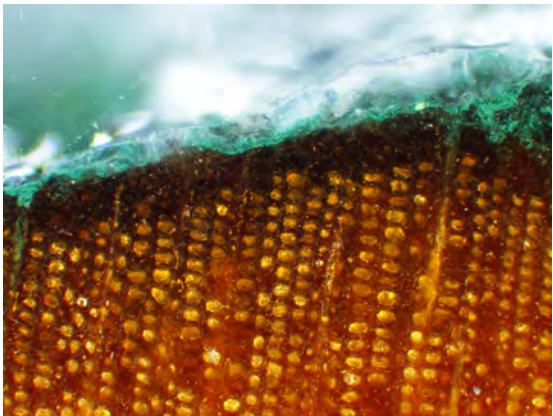


Figure 175: Reflected Light, 40x

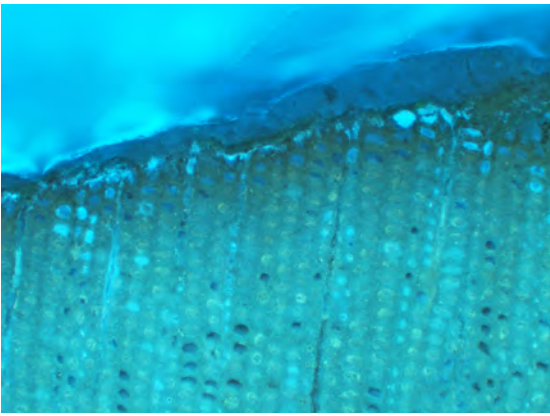


Figure 176: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Brown?	blue	in pores, uneven
2	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 177

SAMPLE NO: ELK.13.6
CABIN: Cook
LOCATION: Porch floor

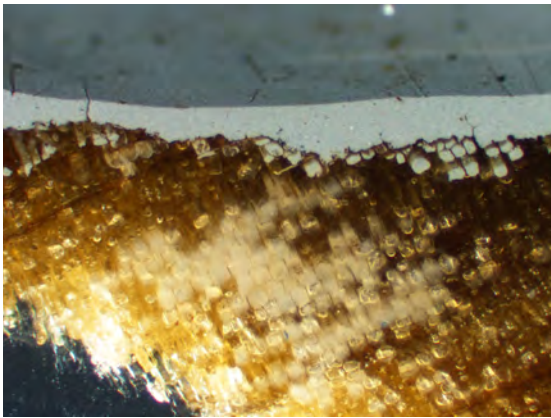


Figure 178: Reflected Light, 40x

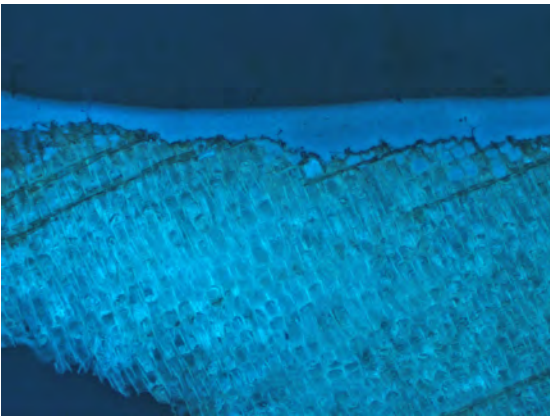


Figure 179: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, soiled
1	Light gray		in pores and on surface

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 180

SAMPLE NO: ELK.15.1
CABIN: Hale
LOCATION: West (front) elevation, batten of board and batten siding at south end of elevation

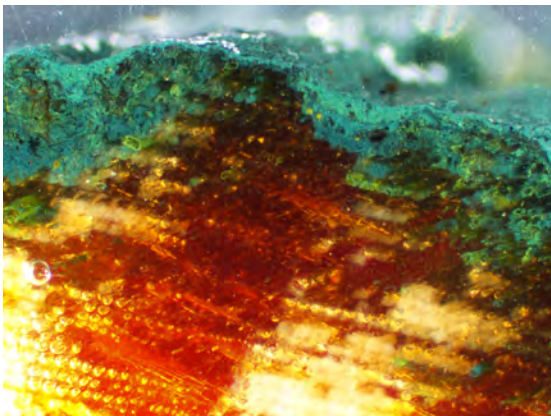


Figure 181: Reflected Light, 40x

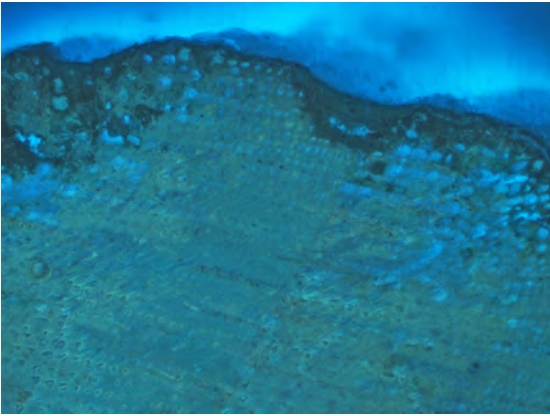


Figure 182: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Brown?	blue	
2	Greens		several greens mixed
3	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

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Finishes Analysis



Figure 183

SAMPLE NO: ELK.15.2

CABIN: Hale

LOCATION: Interior room, original(?) / earlier exposed south wall of cabin, board and batten siding

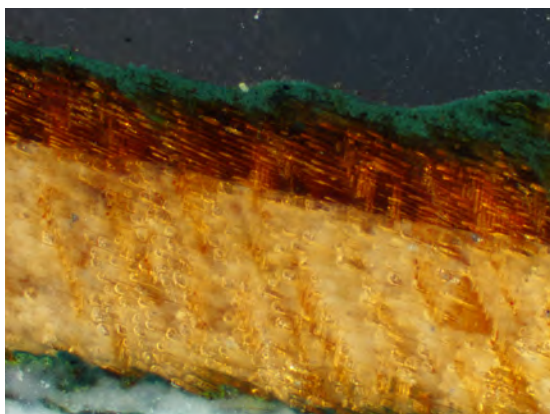


Figure 184: Reflected Light, 40x

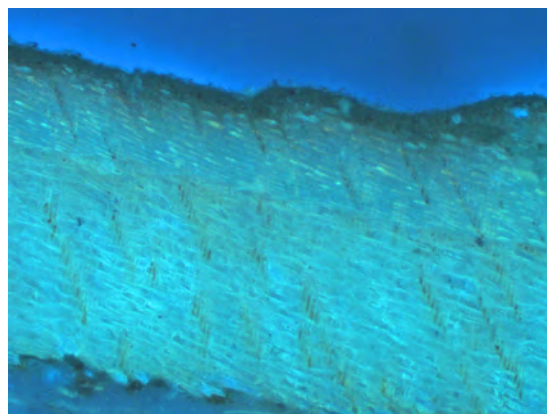


Figure 185: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			darkened , somewhat uneven surface
1	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES



Figure 186

SAMPLE NO: ELK.15.3
CABIN: Hale
LOCATION: Addition/porch enclosure at east end, beaded tongue and groove siding

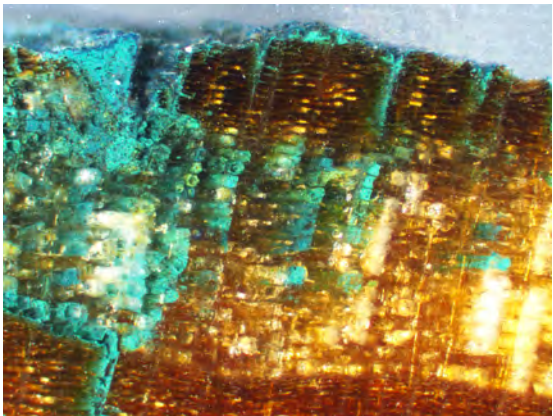


Figure 187: Reflected Light, 40x

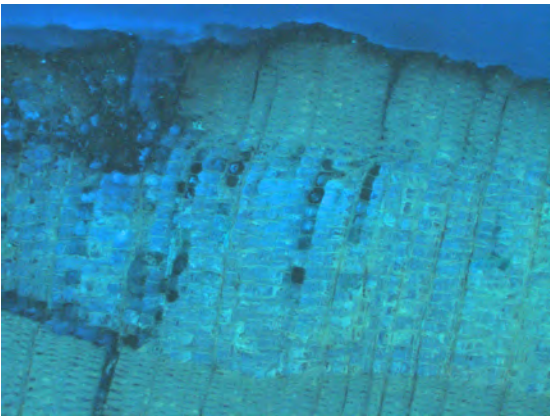


Figure 188: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Greens	none	mixed, in pores

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Elkmont National Historic District Cabins

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Figure 189

SAMPLE NO: ELK.15.4

CABIN: Hale

LOCATION: West (front) elevation, south door, middle rail at hinge stile

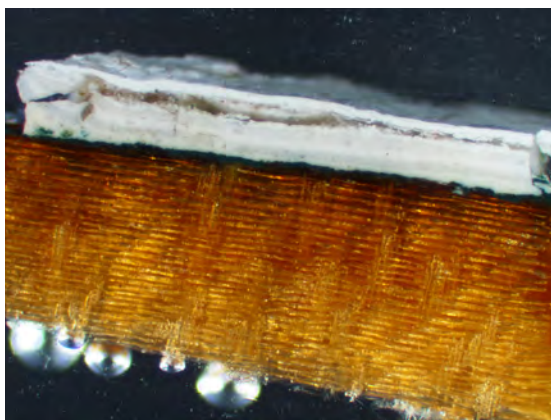


Figure 190: Reflected Light, 40x

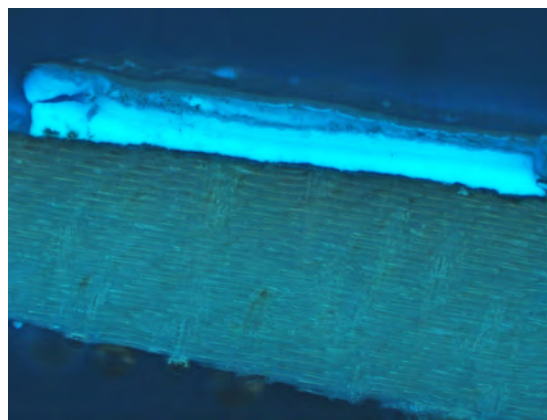


Figure 191: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			
1	Dark green	none	
2	White		
3	Light gray		
4	white		
5	light gray		
6	white		damaged
7	white		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 192

SAMPLE NO: ELK.15.6

CABIN: Hale

LOCATION: West (front) elevation, south window, south surround

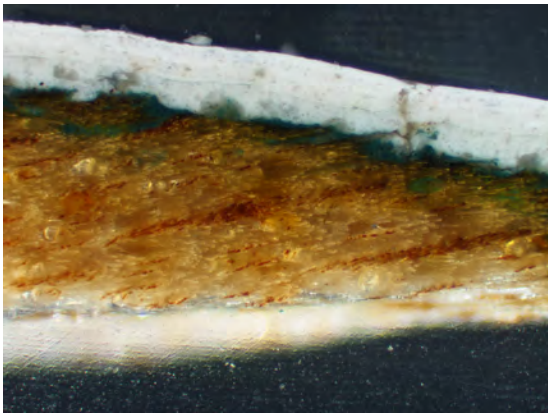


Figure 193: Reflected Light, 40x

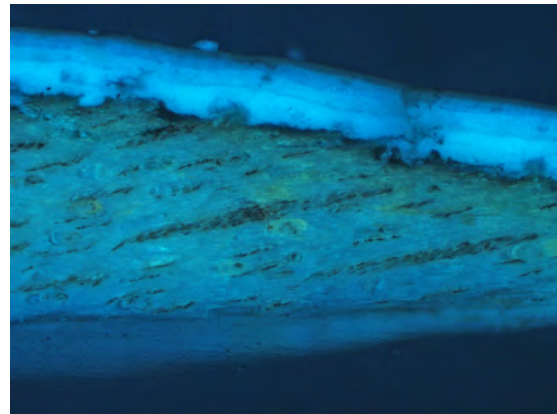


Figure 194: UV Light, 40x

[illegible][illegible]



Figure 195

SAMPLE NO: ELK.38.2
CABIN: Chapman-Byers
LOCATION: Sleeping porch, NE post at second floor

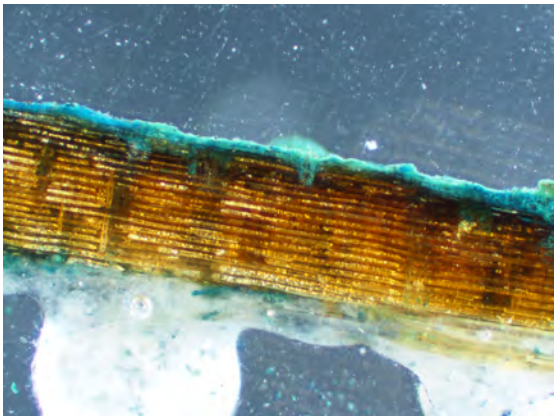


Figure 196: Reflected Light, 40x

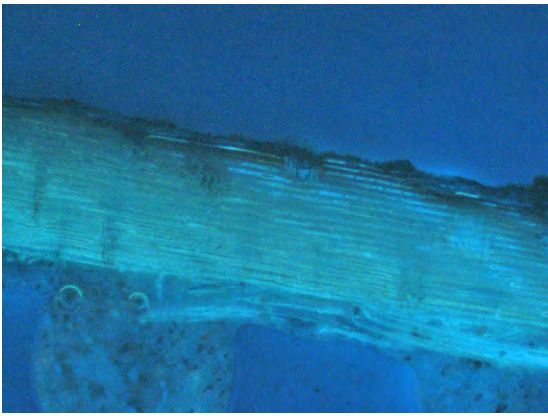


Figure 197: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Green	none	

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Elkmont National Historic District Cabins

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Figure 198

SAMPLE NO: ELK.38.3

CABIN: Chapman-Byers

LOCATION: East elevation, first floor level, front door, surround, panel under south side light

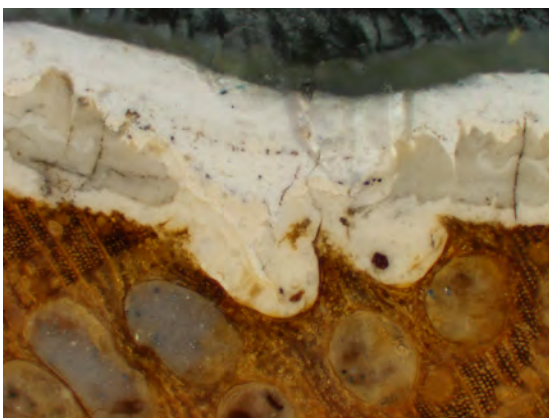


Figure 199: Reflected Light, 40x

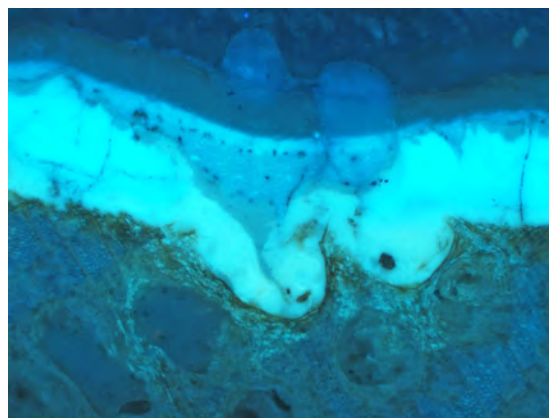


Figure 200: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven
1	Off white/cream		in pores
dirt			
2	Light gray		
dirt			
3	White		
4	White		
5	White		

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

Finishes Analysis



Figure 201

SAMPLE NO: ELK.38.4

CABIN: Chapman-Byers

LOCATION: East elevation, south window, sash, bottom rail of bottom sash

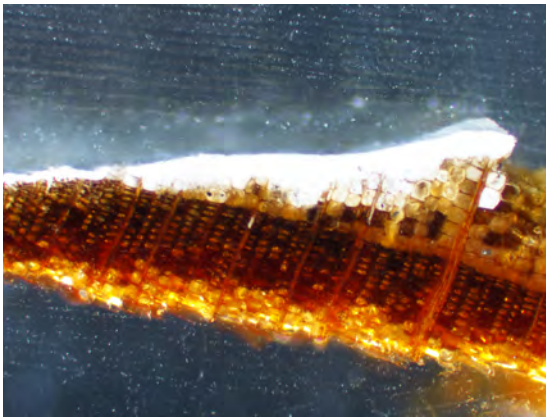


Figure 202: Reflected Light, 40x

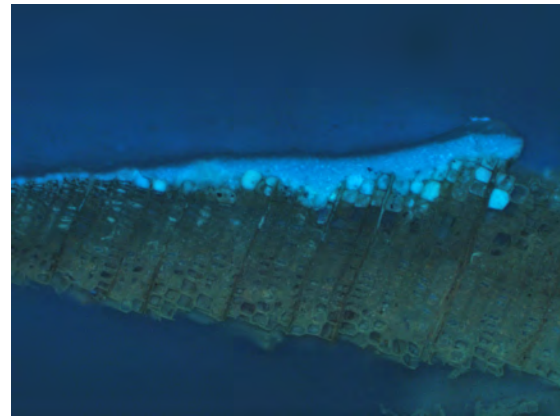


Figure 203: UV Light, 40x

[illegible][illegible]



Figure 204

SAMPLE NO: ELK.38.5
CABIN: Chapman-Byers
LOCATION: South side of porch, siding at batten

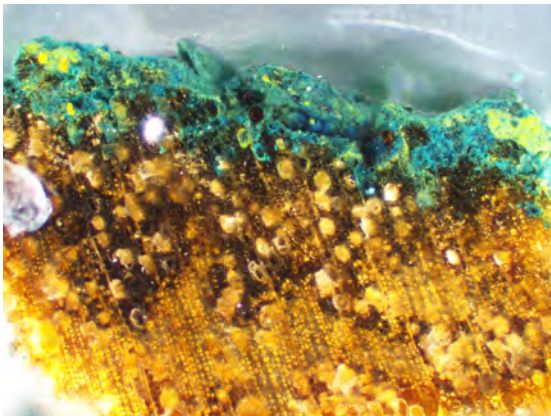


Figure 205: Reflected Light, 40x



Figure 206: UV Light, 40x

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES
Wood			uneven, dark surface
1	Greens/ yellow	none	mixed

LAYER	REFLECTED LIGHT	UV LIGHT	NOTES

APPENDIX C:
Instrumental Analysis (Catherine Matsen)

Date: March 21, 2016

Requestor: Marlene Goeke
Building Conservation Associates, Inc.
242 Cherry Street
Philadelphia, PA 19106
215 923 2834

Analyst: Catherine Matsen
2001 North van Buren Street
Wilmington, DE 19802

SAMPLE DESCRIPTIONS

Exterior wood finishes from Elkmont National Historic District Cabins
Great Smoky Mountains National Park
Elkmont, Tennessee

Sample ELK.8.1 – Cain Cabin. East elevation, siding at location of missing later paint,
between two windows under porch

Sample ELK.8.7 – Cain Cabin. South elevation, siding

Sample ELK.13.4 – Cook Cabin. West elevation, siding, under porch

Sample ELK.38.5 – Chapman-Byers Cabin. South side of porch, siding at batten

PARTICULAR INTEREST

Pigment and binder analysis of the exterior finish samples using Fourier-transform infrared (FTIR) spectroscopy, gas chromatography – mass spectrometry (GC-MS) and scanning electron microscopy – energy dispersive spectroscopy (SEM-EDS); specifically to compare samples ELK.8.7 and ELK.38.5 to see if they are of similar composition and to determine if there are any clear finishes directly on the wood substrates.

EXPERIMENTAL

Fourier-transform infrared (FTIR) spectroscopy

Microgram-sized sample material was isolated as best as possible from the bulk samples provided by the analyst. The samples were analyzed using FTIR (Fourier-transform infrared) microspectroscopy, an instrumental technique that permits the general classification of natural

organic materials (such as waxes, proteins, oils, polysaccharides, and resins) and the specific identification of synthetic resins, inorganic pigments, and natural minerals. The material was placed directly on a diamond cell and rolled flat on the cell with a steel micro-roller to decrease thickness and increase transparency. The sample was analyzed using the Thermo Scientific Nicolet 6700 FT-IR with Nicolet Continuum FT-IR microscope (transmission mode); data was acquired for 120 scans from 4000 to 650 cm^{-1} at a spectral resolution of 4 cm^{-1} . Multiple areas within the same rolled sample were analyzed for reproducibility and to understand the homogeneity of the sample. Spectra were collected with Omnic E.S.P. 6.1a software and analyzed in this program with various IRUG and commercial reference spectral libraries. FTIR can detect compounds present in greater than 10 weight percent concentration.

Scanning electron microscopy – energy dispersive spectroscopy (SEM-EDS)

Cross-section Sample ELK.38.5 was mounted to an aluminum holder with double-sided carbon tape adhesive. Carbon paint was applied on the side and top surfaces of casting medium, without covering the cross-section itself, to prevent charging. The samples were examined using a Zeiss EVO MA15 scanning electron microscope with LaB₆ source at an accelerating voltage of 20kV for the electron beam, stage height of approximately 11mm, and sample tilt of 0°. The EDS data was collected with the Bruker Nano X-flash® detector 6 | 30 and analyzed with Quantax 200/Esprit 1.9 software.

Gas chromatography – mass spectrometry (GC-MS)

Oils, resins, varnishes, and waxes

Samples containing the aforementioned classes of compounds are often composed, in part, of carboxylic acids or esters. To reduce the molecular weight and make the components more volatile, treatment of the samples with MethPrep II reagent converts carboxylic acids and esters to their methyl ester derivatives. The green paint from Sample ELK.38.5 was transferred to a glass GC vial and then approximately 50 μL of 1:2 MethPrep II reagent (Alltech) in benzene was added. The vial was warmed at 60°C for one hour in the heating block, removed from heat, and allowed to stand to cool.

Samples were analyzed using the Agilent Technologies 7820 gas chromatogram equipped with Agilent 5973 mass selective detector (MSD) and an automatic liquid injector. A sample volume (splitless) of 1 μL was injected onto a 30m $\times$ 250 μm $\times$ 0.25 μm film thickness HP-5MS column (5% phenyl methyl siloxane at a flow rate of 1.5mL/minute). The Agilent Technologies G1701EA GC/MSD ChemStation Control software was used with Winterthur RTLMPREP method with conditions as follows: inlet temperature was 320°C (splitless mode) with a nine minute solvent delay. The GC oven temperature program was 55°C for two minutes, then ramped at 10°C/minute to 325°C, followed by a ten minute isothermal period. The transfer line temperature to the MSD (SCAN mode) was 280°C, the source at 230°C and the MS quad at 150°C.

RESULTS

The FTIR samples with appropriate reference spectra are provided in Figures 1-4. The total ion chromatogram (TIC) of Sample ELK.38.5 is shown in Figure 5.

Two elemental maps of cross-section samples ELK.38.5 were gathered at 208× and 236× magnification. Back-scattered electron (BSE) images, select false-color elemental maps and energy-dispersive spectra (EDS) are provided in Figures 6-9.

DISCUSSION

Sample ELK.8.1 - Cain Cabin. East elevation, siding at location of missing later paint, between two windows under porch

The main component detected in the first, dark green finish layer is a clay; a reference spectrum for montmorillonite ((Na,Ca)_{0.33}(Al,Mg)₂(Si₄O₁₀)) is provided for comparison (Figure 1). Prussian blue pigment (Fe[Fe₂(CN)₆]₃) is also clearly identified with the cyano (CN) stretch at approximately 2100cm⁻¹. An organic component of the sample is evident in the spectrum with C-H peaks from 3000-2800cm⁻¹ and C-O stretches from 1800-1200cm⁻¹, yet the shapes are not distinct enough for a specific identification. The stretch shapes suggest a natural binding medium composition such as an oil or resin; the stretches are not suggestive of a synthetic polymer or alkyd composition.

Sample ELK.8.7 – Cain Cabin. South elevation, siding

The dark green finish of this sample is applied directly to the wood substrate and is extremely thin. Wood fibers is the main component in the FTIR spectrum of this sample due to the difficulty of isolating the thin green finish (Figure 2). A stretch at approximately 2100cm⁻¹ indicates the presence of Prussian blue pigment in the finish.

Sample ELK.13.4 – Cook Cabin. West elevation, siding, under porch

As with Samples ELK.8.1 and ELK.8.7, Prussian blue pigment is detected in the green finish of sample ELK.13.4 (Figure 3). Clay is also detected with Si-O stretches detected around 1000cm⁻¹ and water of hydration O-H stretches detected around 3700-3600cm⁻¹; a reference spectrum for kaolinite (Al₂Si₂O₅(OH)₄) is provided. The stretch between 1500-1300cm⁻¹ is characteristic of a carbonate (CO₃²⁻), either from lead white (2PbCO₃·Pb(OH)₂) or calcium carbonate (CaCO₃).

As with sample ELK.8.1, an organic component of the sample is evident in the spectrum with C-H peaks from 3000-2800cm⁻¹ and C-O stretches from 1800-1200cm⁻¹, yet the shapes are not distinct enough for a specific identification. The stretch shapes suggest a natural binding medium composition such as an oil or resin; the stretches are not suggestive of a synthetic polymer or alkyd composition.

Sample ELK.38.5 – Chapman-Byers Cabin. South side of porch, siding at batten

The primary elements detected with SEM-EDS analysis of this sample are silicon, aluminum and iron (Figures 7 and 8). This elemental profile suggests a similar composition of aluminosilicate clays and Prussian blue detected in sample ELK.8.1 and ELK.13.4. Though the elements do not map well, the EDS spectra from both maps (208× and 236× magnifications) detect weak amounts of lead (Pb), barium (Ba) and chromium (Cr). These elements suggest the low concentration of the pigments lead white, barium white (BaSO₄) and yellow lead chromate

(PbCrO_4) yet these pigments would need to be confirmed with a technique such as Raman spectroscopy.

Undispersed yellow pigment is seen towards the top of the green finishes in the cross-section photomicrograph of this sample. The BSE images and maps show a distinct layer with the yellow (iron-containing) pigment and higher concentration of aluminum and silicon. This suggests there are two green-colored finish layers in this sample.

Though the SEM-EDS analysis suggests there are two green finish layers in this sample, the two finishes could not be separated and isolated for GC-MS analysis. FTIR analysis of the two green finishes/paints shows the presence of an acrylic binding medium, clay (a reference spectrum for kaolinite is provided) and Prussian blue pigment. Acrylic paint binding media is known commercially, and for architecture, as latex paint. Gas chromatography of the two green finishes detects an overwhelming amount of wood products because the paints could not be cleanly isolated from the substrate either (Figure 5). However, three marker compounds indicative of a drying oil are detected: azelaic acid dimethyl ester (at 14.300minutes), palmitic acid methyl ester (at 18.411minutes) and stearic acid methyl ester (at 20.325minutes). It is assumed the drying oil is present in the first green finish applied to the wood substrate. The binding medium of the second green paint layer is an acrylic as determined by FTIR and based on examination of the bulk sample. Acrylic media is not detectable with GC-MS and so one can deduce that the oil component is coming from the first green finish layer; the monomer units of acrylics are only detectable with pyrolysis-GC-MS.

CONCLUSIONS

FTIR analysis of sample ELK.8.1, ELK.8.7 and ELK.13.4 detect Prussian blue pigment in the green finishes. The presence of this pigment is inferred with SEM-EDS analysis of sample ELK.38.5. The primary components detected in the green finishes are clays (with FTIR) or aluminum and silicon (with SEM-EDS).

Analysis of the green paint finishes of Sample 38.5 with GC-MS detects the presence of a drying oil. The drying oil is most likely present in the first green finish because acrylics are not detectable with GC-MS alone, but instead with py-GC-MS.

Examination of the cross-section photomicrographs does not indicate the presence of an original, clear finish applied directly to the wood substrate.

Figure 1 Elkmont

Fourier-transform infrared spectroscopy (FTIR)

Sample ELK.8.1 first dark green finish layer (red spectrum) overlaid with reference spectra for Prussian blue pigment (blue spectrum) and montmorillonite ((Na,Ca)_{0.33}(Al,Mg)₂(Si₄O₁₀)) (green spectrum)

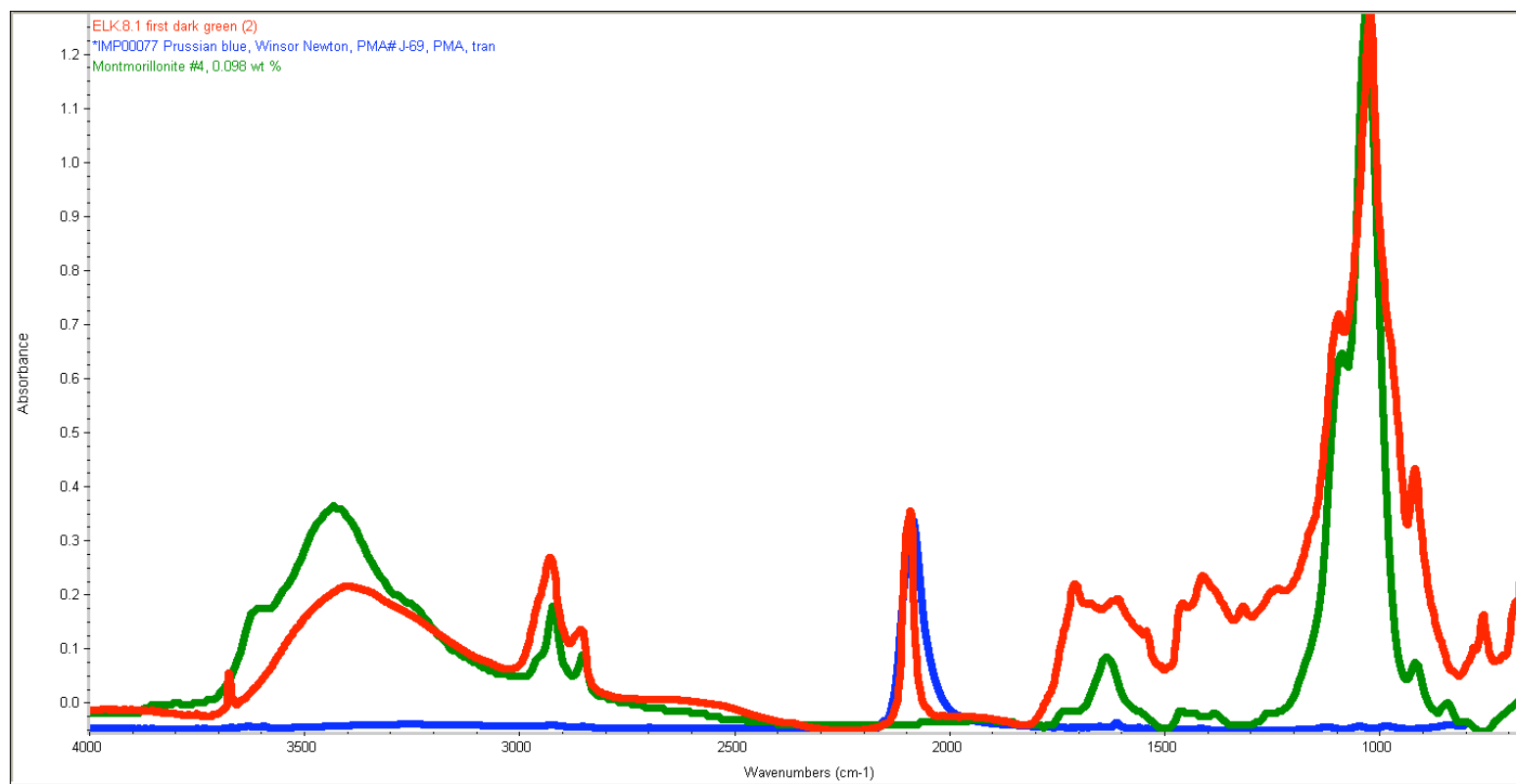


Figure 2 Elkmont

Fourier-transform infrared spectroscopy (FTIR)

Sample ELK.8.7 dark green finish layer (red spectrum) overlaid with reference spectra for Prussian blue pigment (blue spectrum) and wood flour (i.e. wood fibers) (green spectrum)

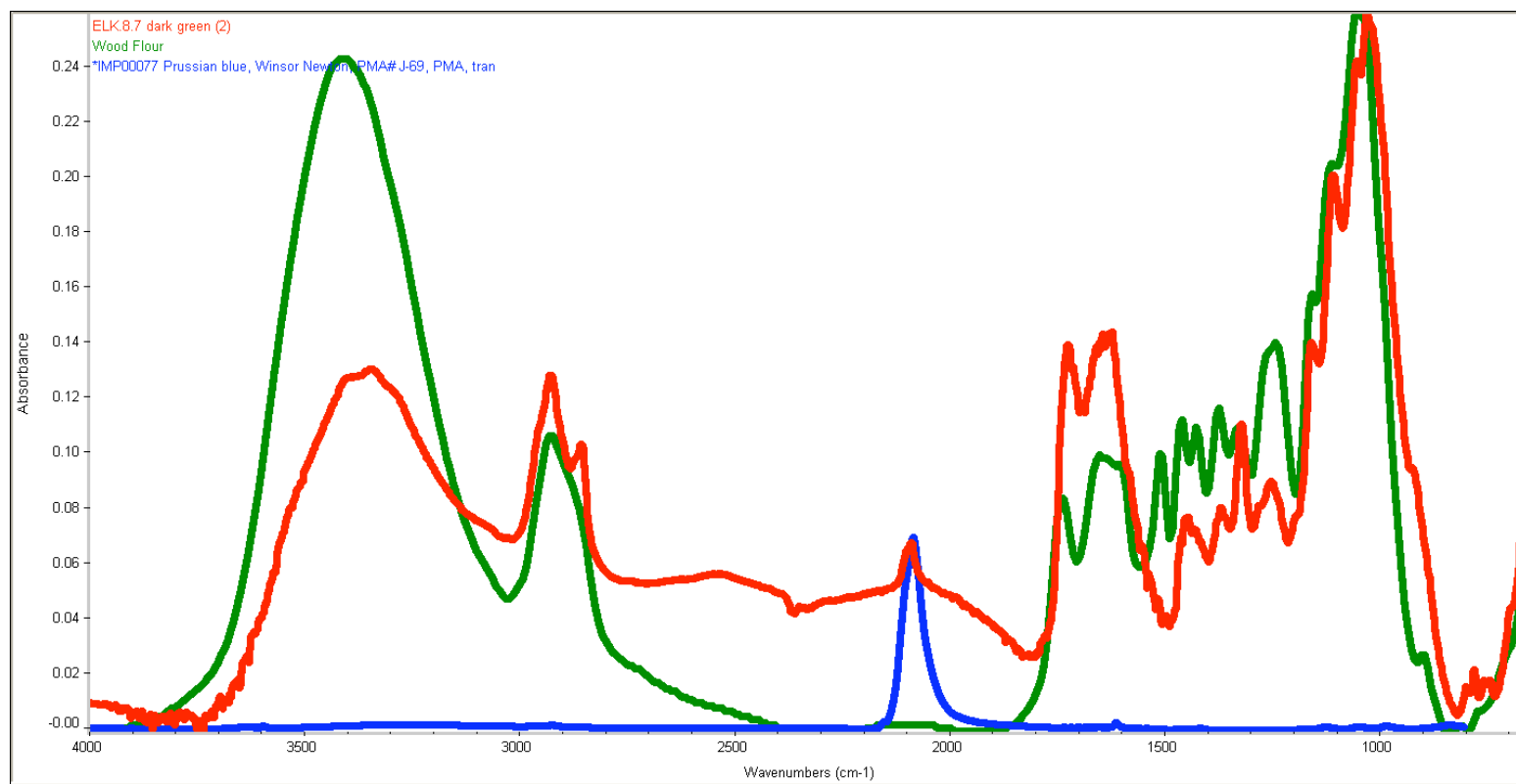


Figure 3 Elkmont

Fourier-transform infrared spectroscopy (FTIR)

Sample ELK.13.4 dark green finish layer (red spectrum) overlaid with reference spectra for Prussian blue pigment (blue spectrum), kaolinite clay ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$, green spectrum) and Halcarb 20 (i.e. basic lead carbonate/lead white pigment, purple spectrum)

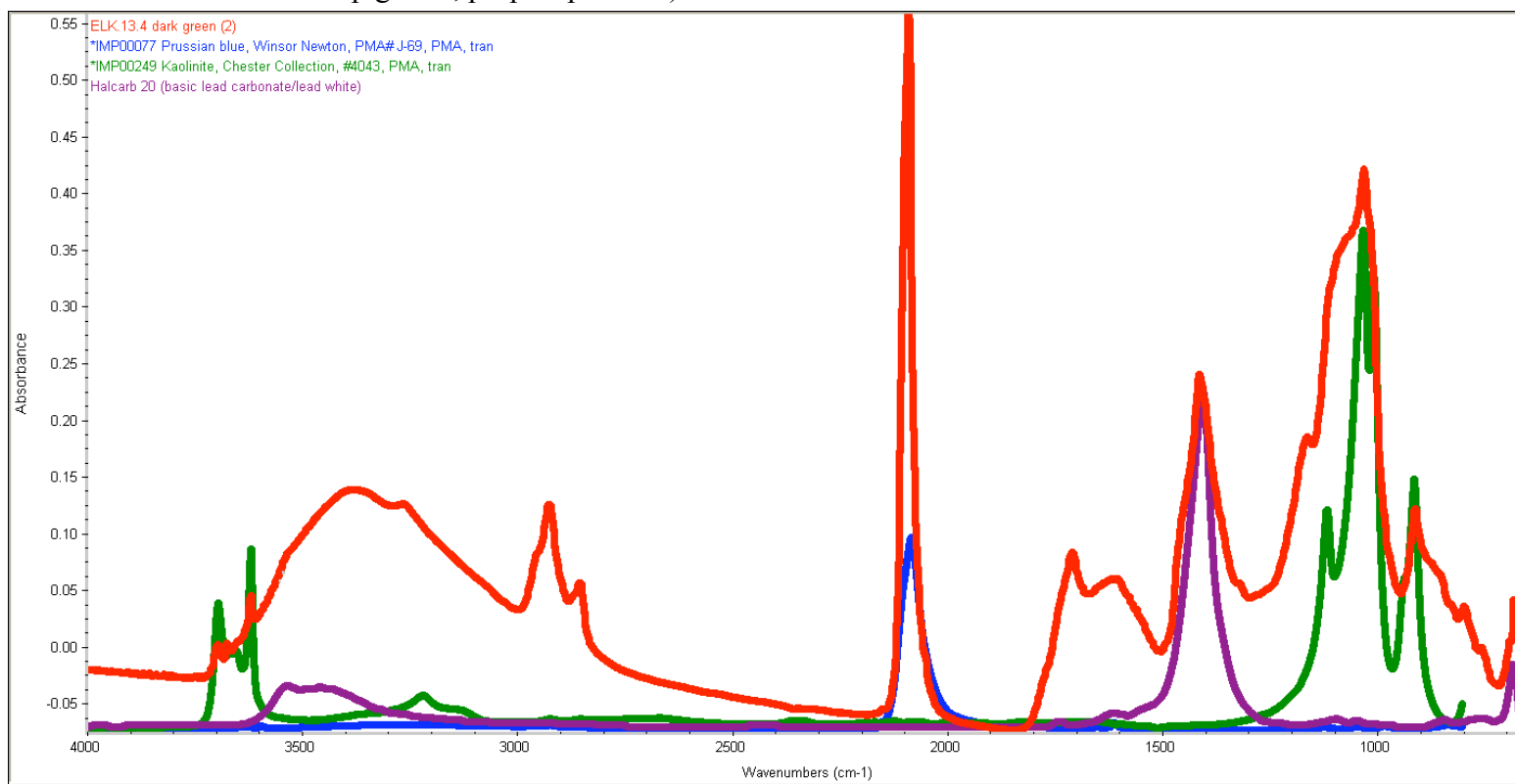


Figure 4 Elkmont

Fourier-transform infrared spectroscopy (FTIR)

Sample ELK.38.5 green finish layer (red spectrum) overlaid with reference spectra for UCAR 506, an acrylic (green spectrum), kaolinite clay ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$, turquoise spectrum) and Prussian blue pigment (blue spectrum)

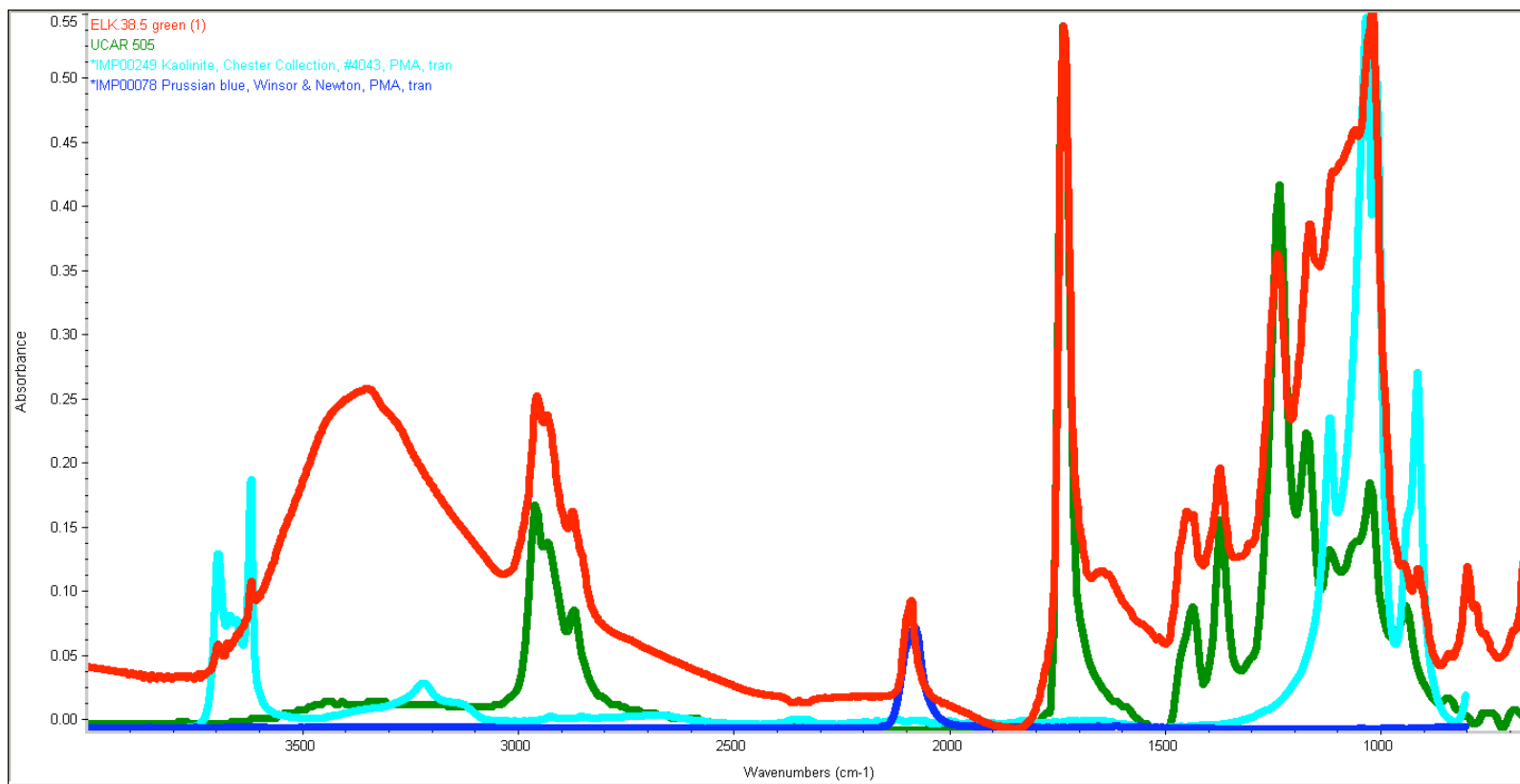


Figure 5 Elkmont
Gas chromatography – mass spectrometry (GCMS)
Sample ELK.38.5 green finish layer

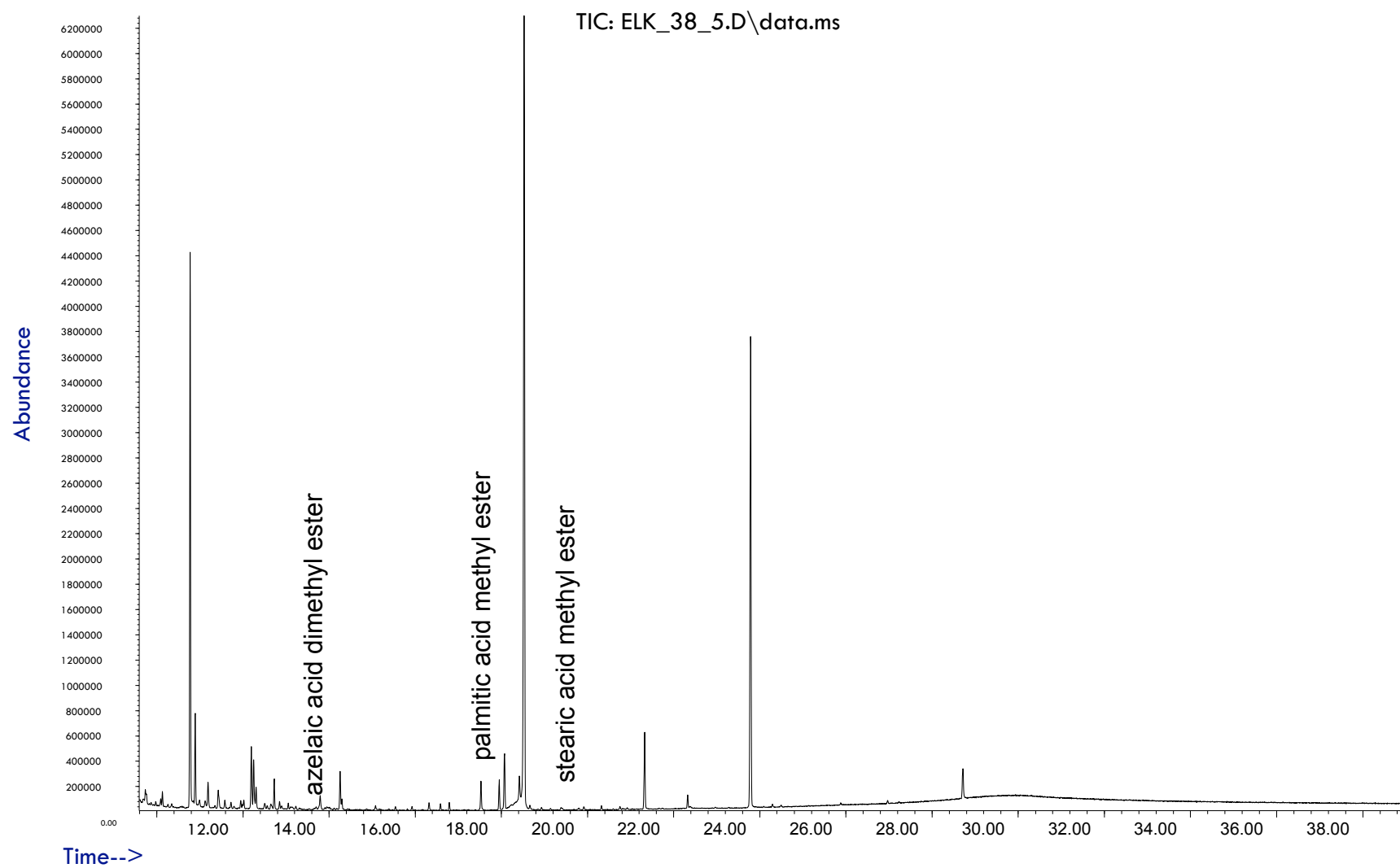


Figure 6 Elkmont
Scanning Electron Microscopy – Energy Dispersive Spectroscopy (SEM-EDS)
Sample ELK.38.5

Back-scattered electron image 43× magnification

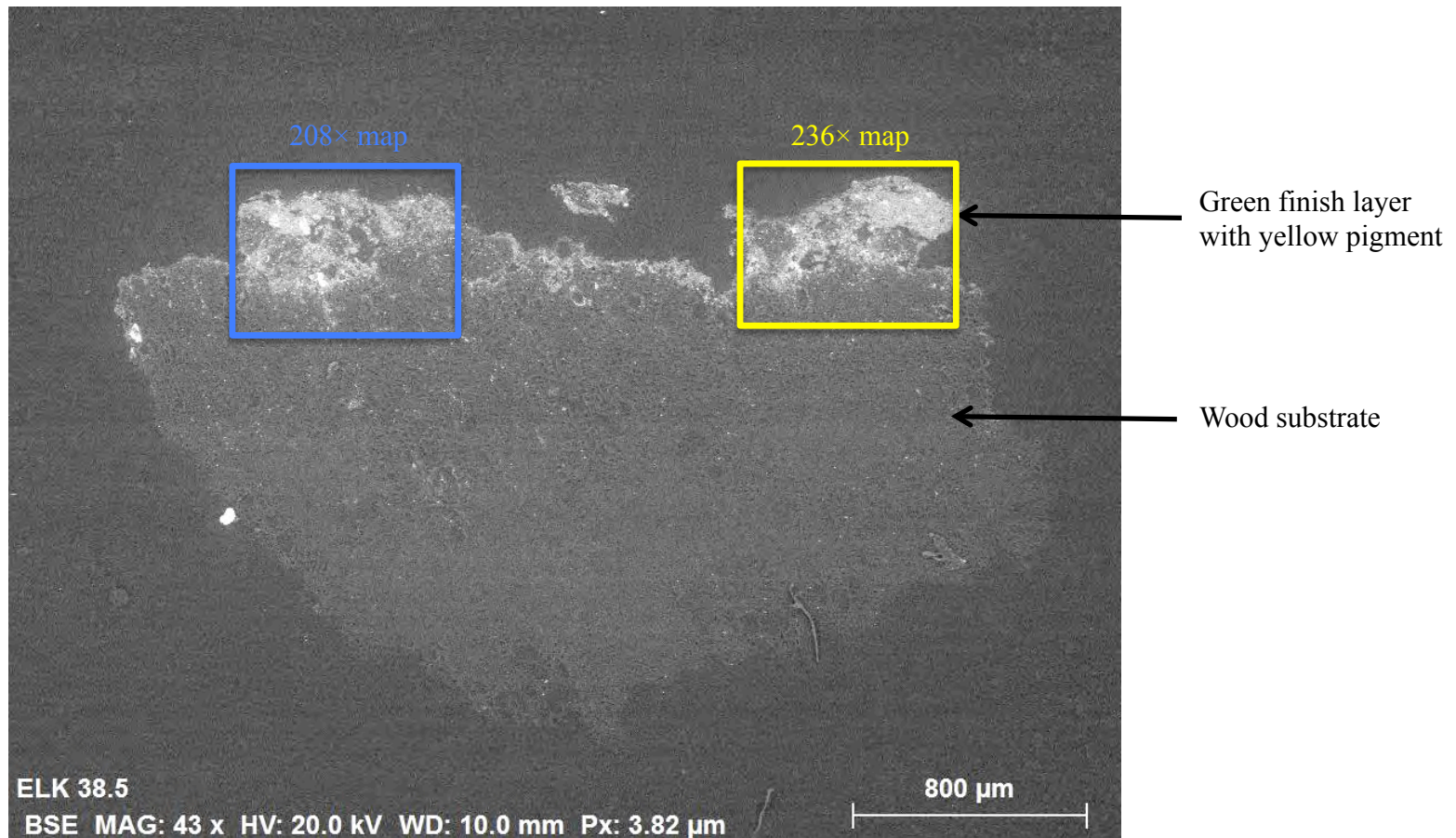
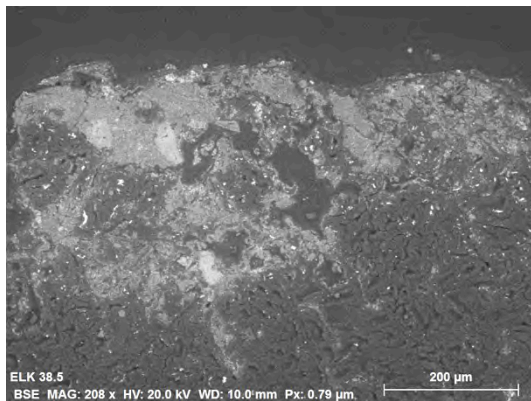
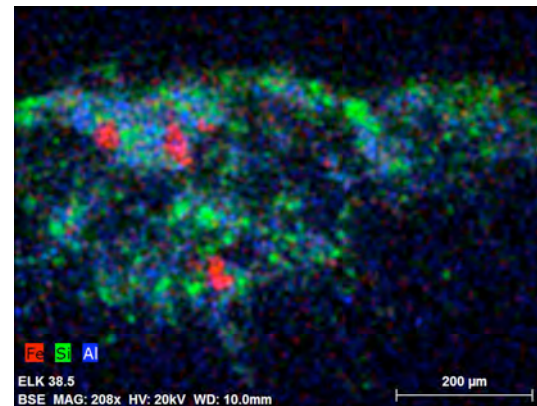


Figure 7 Elkmont
Scanning Electron Microscopy – Energy Dispersive Spectroscopy (SEM-EDS)
Sample ELK.38.5

Back-scattered electron (BSE) image, 208× magnification



Elemental false-color map, 208× magnification



Energy dispersive spectrum (EDS), 208× magnification

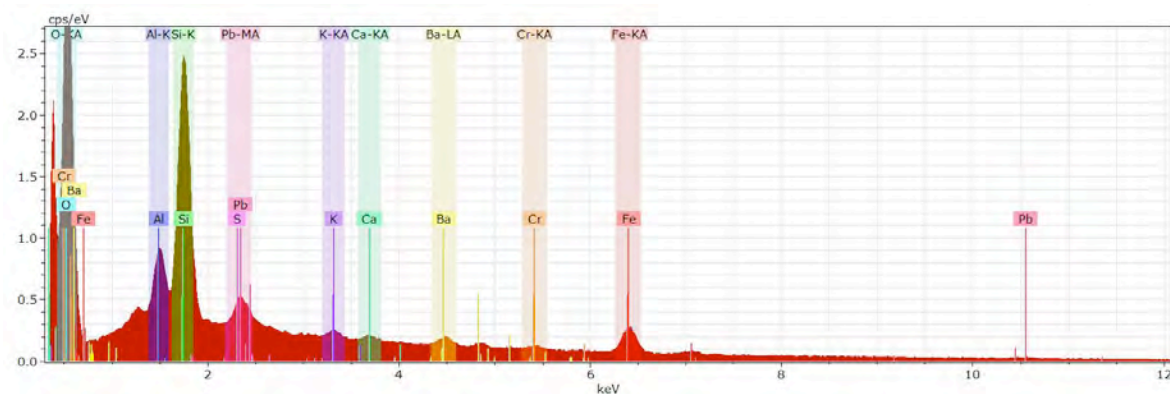
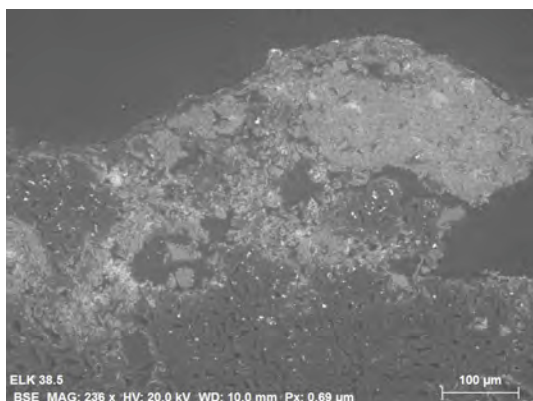
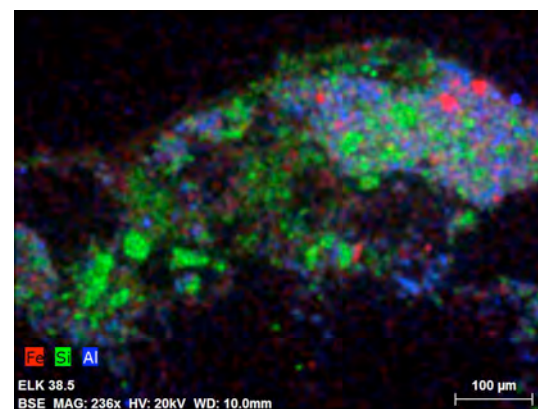


Figure 8 Elkmont
Scanning Electron Microscopy – Energy Dispersive Spectroscopy (SEM-EDS)
Sample ELK.38.5

Back-scattered electron (BSE) image, 236× magnification



Elemental false-color map, 236× magnification



Energy dispersive spectrum (EDS), 236× magnification

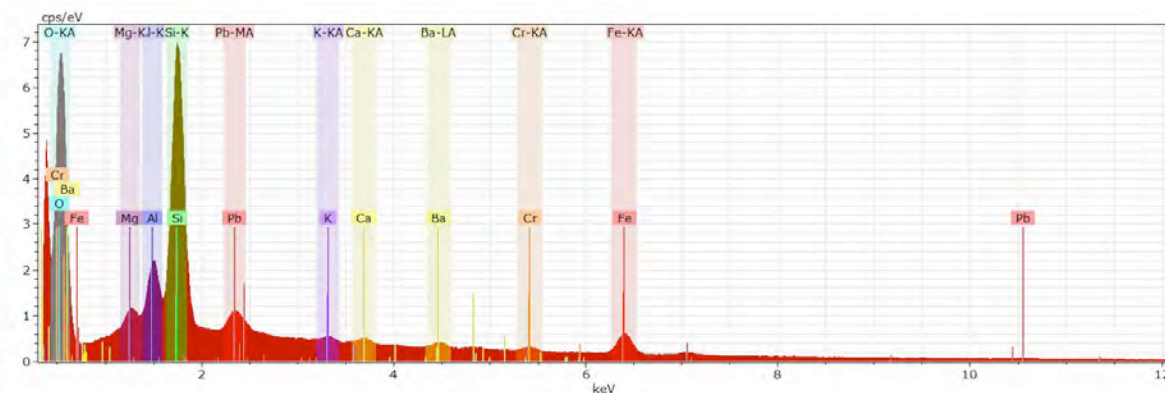
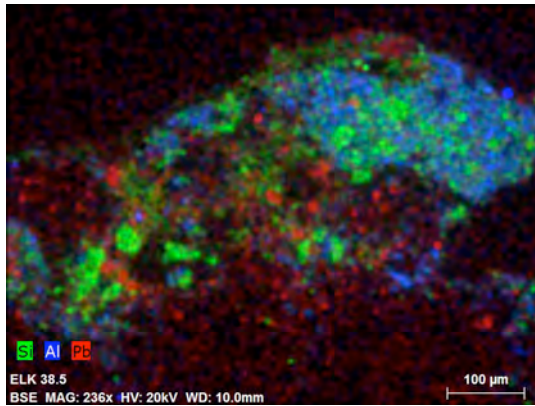
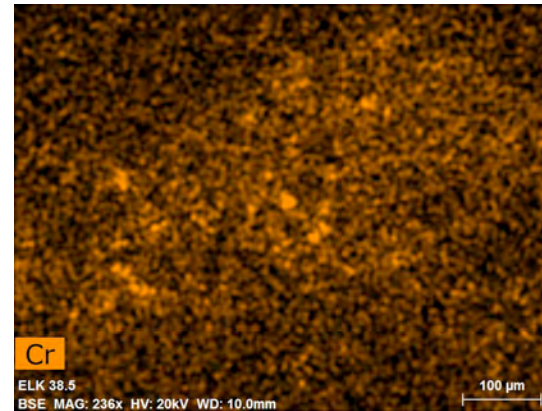


Figure 9 Elkmont
Scanning Electron Microscopy – Energy Dispersive Spectroscopy (SEM-EDS)
Sample ELK.38.5

Elemental false-color map, 236× magnification



Elemental false-color map, 236× magnification



Elemental false-color map, 236× magnification

