



FINAL REPORT

**HISTORIC CONTEXT AND ARCHITECTURAL REPORT FOR THE
RAYONIER PERFORMANCE FIBERS FACILITY IN
FERNANDINA BEACH, FLORIDA**

PREPARED FOR

RAYONIER ADVANCED MATERIALS

PREPARED BY

SEARCH

SEARCH PROJECT NO. 240216

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THE HISTORY OF THE RYAM FERNANDINA PULP AND PAPER PLANT

CELLULOSE AND LAND: A NEW RAYONIER FACILITY

The Rayonier Performance Fibers (RYAM) Fernandina Pulp and Paper Plant was created because of economic demand and a scientific breakthrough. During the 1930s, the demand for chemical cellulose was growing due to its inclusion in a variety of consumer goods and materials, including paper and textiles. The demand from the Japanese rayon market increased the need for cellulose beyond the existing supply. Chemical cellulose is principally derived from trees, and in the United States, commercial pulp productions relied heavily on western hemlock as a raw material. At the end of the 1930s, the use of raw materials from other parts of North America allowed for the establishment of the Fernandina facility and Rayonier Inc.'s (Rayonier) expansion from the west coast to the south.

In 1936, Clyde B. Morgan joined Rayonier at the behest of company president Edward M. Miller. Morgan, a former executive vice president of S.S. Warran company, was elected to the board of directors in 1937 and was tasked with building a new mill to meet the growing demand for chemical cellulose around the world. His arrival was timely—in the 1930s, scientists at Rayonier developed a new formula that allowed commercial pulp to be derived from the southern yellow pine. Although yellow pine is highly resinous and previously had not been highly regarded for cellulose production, by this time, thanks to Rayonier's technological innovations, it was considered an acceptable raw material. It was also advantageous as a less expensive alternative to hemlock. Morgan immediately recognized the potential of property acquired by Rayonier in 1937 near Fernandina Beach, Florida, to address both the market needs and his direction to increase capacity.

Morgan knew Fernandina, which incorporated in 1824 and was occupied as early as the sixteenth century, was near the vast timberlands of northeastern Florida, which were a source of raw material for cellulose production. The location also had the Amelia River as a water source, an established town with an established population, and other support services (ITT Rayonier 1989). Additionally, Fernandina was connected to the broader southeastern United States by the Seaboard Air Line Railroad, allowing for the import of raw materials and the export of finished goods (Davis 1968:7). Ultimately, Morgan chose a 175-acre plot of land on Amelia Island within Fernandina Beach for Rayonier's new mill.

FERNANDINA BEACH ECONOMIC DEVELOPMENT AND RAYONIER'S ARRIVAL

Fernandina Beach owes its early economic success to the Florida Railroad, which arrived in 1861, well before the Seaboard Air Line Railroad was completed in 1900. Built with the support of senator David L. Yulee, the railroad stretched from Fernandina Beach to Cedar Key, connecting Florida's Gulf coast and Atlantic coast for the first time. Up to the 1920s, Fernandina Beach ranked among the busiest seaports on Florida's Atlantic coast (Hicks 2014:ix–x). According to the US Army Corps of Engineers, Fernandina Harbor moved roughly 580,000 tons of goods at a value of roughly \$11.5 million in 1910 (US Army Corps of Engineers 1921:662–664).

Fernandina Beach's economic prosperity waned during the 1920s due in large part to Henry Flagler's Florida East Coast Railway and the rapid development of Jacksonville just east of Amelia Island. Flagler's railroad transported goods and passengers rapidly along the Atlantic coast, diminishing the importance of the Florida Railroad. Marked economic decline coupled with the onset of the Great Depression prompted Fernandina Beach officials to turn to heavy industry, particularly forest products, to bolster the flagging local economy. Through the efforts of community leaders, such as city manager O.H. Anderson, Fernandina Beach reached an agreement with two companies to construct paper and pulp mills. The companies included Kraft Corporation of America, a subsidiary of the Container Corporation of America, and Rayonier.

As evidenced by newspaper headlines at the time such as "Return of Big Business Brings Fernandina Boom" and "Cinderella City Finds Her Slipper in Pulp Mills," the confirmed arrival of the Rayonier mill was met with enthusiasm by Fernandina Beach officials. City leaders and the community at large saw the proposed plant's promise of jobs and a return on investment as the long-awaited solution to city's economic woes (Foley 1937; Hicks 2014:ix–x; *Palm Beach Post*, 18 July 1937:7). By the end of July 1937, Rayonier created a subsidiary company, subsequently known as the Fernandina Pulp and Paper Company, to oversee its operations in northern Florida. Less than a month later, on August 17, the Fernandina Pulp and Paper Company announced an agreement with Rust Engineering of Pittsburgh, Pennsylvania, to construct its Fernandina mill for roughly \$6 million. Designed to produce roughly 180 tons of chemical cellulose a day, the plant was expected to be operational by the summer of 1938 (Rayonier n.d.:50; *The Dayton Herald*, 17 August 1937:14).

THE MILL'S CONSTRUCTION AND OPERATION TO THE ONSET OF WORLD WAR II

Construction of the Fernandina mill began in August 1937, almost immediately after the selection of the Fernandina Beach site. Work was soon halted due to the unexpected collapse of the Japanese rayon market at the onset of World War II, with the Japanese invasion of China and resultant policies adopted by the imperial Japanese government to regulate imports, including American-made chemical cellulose. During the construction shutdown, Rayonier dissolved the

Fernandina Pulp and Paper Company and replaced it with the Fernandina Division of Rayonier (Rayonier n.d.:50).

The interruption was short-lived. By the spring of 1939, domestic demand coupled with a strengthening US economy compelled Rayonier to resume the work required to complete the Fernandina mill. The project was completed less than a year later, and the first sheet of pulp came out of the facility's dryers on December 10, 1939 (Rayonier n.d.:55–57). The plant was the first of its kind to produce rayon pulp in commercial quantities from southern pine, producing 64,000 tons per year (*Panama City News-Herald*, 2 March 1940:4). The magazine *Manufacturers Record* praised the opening of the plant at Fernandina, saying, "the mill represents a great accomplishment and is the culmination of years of research, for this will be the first time that commercial rayon pulp has ever been produced from southern pine by means of the sulphite [sulfite] process" (*Panama City News-Herald*, 2 March 1940:4).

Over the next 12 months, the mill grew to over 500 Black and white employees (*News-Leader*, 28 November 1979:28–29). The mill's impact on the city economy was tremendous. Employees accounted for nearly 20% of Fernandina's total population in 1940. Additionally, the city experienced a roughly 15% population boom during the 1930s, due at least in part to the jobs created by Rayonier at the mill. Consequently, the population increase, the first since 1910, drove the city's expansion during this period (US Census Bureau 1940:123).

WORLD WAR II AND THE POSTWAR EXPANSION ERA

On December 7, 1941, Japan attacked Pearl Harbor, plunging the United States into direct participation in World War II, its second global conflict in less than three decades. Like many companies in the United States, Rayonier and its Fernandina mill supported the American response through its manufacturing capabilities. In October 1942, the War Production Board directed Rayonier to dedicate a substantial portion of its overall capacity to the production of nitrating pulp for use in munitions to support the domestic war effort. Rayonier was one of the several southeastern mills that amped up war time production in order to meet the immense demand for paper products. The northern, older mills outpaced production of the southeastern mills until 1942 when the southern mills produced twice as much wood pulp than any other region in the country. The southern mills were newer, bigger, and faster and able to work year round, unlike their northern counterparts (Brandis 1944). The southeastern mills saw a 15.5% increase in production in 1944 from 1943, with the mill at Fernandina being a major producer during this time (Brandis 1944). Additionally, Rayonier-owned machine shops, such as those at the Fernandina mill, were tasked with building propellers for the US Navy. Subsequently, Rayonier received a 48-star flag from the federal government for the company's wartime contributions (Rayonier n.d.:58–110; Rayonier 2024).

After the war, between 1945 and 1946, the Fernandina mill and the rest of the Rayonier corporation transitioned back to its prewar production. By 1950, the Fernandina plant employed

more than 580 people, resulting in a weekly payroll greater than \$30,000 (Wilder 1948). A year later, Rayonier upgraded the mill's capabilities to include additional digester facilities, which resulted in an increased overall output of over 250 tons of wood cellulose daily (Rayonier n.d.:113). Per a 1957 article in the *Panama City News-Herald*, the Fernandina mill's steady productivity coupled with Rayonier's ascension atop the cellulose industry contributed to the region's postwar prosperity. In that year alone, more than \$6.5 million was spent in Nassau County by Rayonier and fellow Fernandina employer Container Corporation of America (Streetman 1957). According to US Census data, the city of Fernandina Beach's population grew by roughly 60% during the 1950s, and its population was approximately 7,300 in 1960. By this time, the unemployment rate for Fernandina Beach was roughly 6%, and nearly 33% of the population was employed in the city's manufacturing industry (US Census Bureau 1950:130).

A GREEN TRAJECTORY: TOWARD AN ENVIRONMENTALLY SUSTAINABLE FUTURE

Since the 1960s, Rayonier has invested in environmentally conscious technology. This is due in no small part to the ecologically sensitive nature of the Fernandina Beach area at the confluence of the St. Marys River, Amelia River, and Atlantic Ocean, as well as the wetlands and marshes that characterize Amelia Island (*News-Leader*, 22 November 1989:15; 22–23). At the advent of the environmental movement, Rayonier began addressing pollution and adopting more sustainable manufacturing practices. In response to the rupture of an outfall pipe in 1969, the company took quick mitigation steps to avoid similar events in the future. This included a 1970 proposal for a multimillion-dollar pollution control facility.

Rayonier faced environmental challenges head-on, continuing to support the community that it had employed since the 1930s. The company embarked on a series of major projects designed to pivot the Fernandina mill toward an environmentally sustainable future. The first was a waste treatment system, which was completed in 1976. The roughly \$80 million project was brought online a year later, and it reduced the mill's total daily waste load of biological oxygen demand by 95% (*News-Leader*, 22 November 1989:15; 22–23). Three decades later, after working with local environmental monitoring and reporting efforts, Rayonier furthered its push for cleaner operations at its Fernandina mill via a \$30 million power generation system. The project included a new boiler designed to run predominately on biomass, such as tree trimmings and bark, instead of fossil fuel. The new system allowed the mill to significantly reduce its emissions, including particulate matter, by nearly half (Parnell 2006). Further emission reductions at the Fernandina mill occurred between 2010 and 2018 as a result of voluntary improvements implemented by Rayonier¹ in response to then-newly adopted Environmental Protection Agency (EPA) Ambient Air Quality Standards. Based on data obtained via advance modeling techniques designed to simulate facility emissions and atmospheric conditions, Rayonier engineers proposed, and subsequently saw to the construction of, a new 165-foot stack for the mill's vent gas scrubber system. The multi-million dollar project resulted in a reduction in the mill's sulfur dioxide (SO₂) emissions from 250 parts per million (ppm) to 100 ppm.

¹ This work was completed by RYAM after it was spun-off from Rayonier in June of 2014.

On a larger scale, Rayonier's proactive response to the standards set forth by the EPA contributed to Nassau County achieving a change in designation from an area of non-attainment to one of attainment.² Nassau County's status change was the first such flip by a county from an area of non-attainment to attainment in the nation under the EPA's 2010 standards (Florida Department of Environmental Protection [DEP] 2014).

The most recent environmental sustainability effort at the Fernandina plant is a proposed Second Generation (2G) BioEthanol process, which RYAM began considering and designing in 2023. While engineering remains in the development stage, RYAM is nearing the time it will present its site plan to the City of Fernandina Beach. The project entails using the sugars contained spent sulfite liquor, an existing byproduct of the Fernanda pulp mill operations, to create Second Generation (2G) BioEthanol through a biological fermentation process. 2G BioEthanol is a renewable alternative to fossil-fuel-based gasoline, and its production in Fernandina Beach diversifies and modernizes the manufacturing industry on Amelia Island. The production of 2G BioEthanol will not create additional emissions, and it is expected to "create new, good paying jobs" (Roberts 2023).

As of 2024, RYAM's Fernandina facility ranks among Nassau County's top employers. The plant employs roughly 340 people, resulting in annual labor income greater than \$50 million (Hodges et al. 2016:16). Since the facility's establishment in 1937, four generations of employees have lived and worked locally. RYAM continues its community investment and support of the economy in Fernandina Beach through its planned 2G BioEthanol process expansion, creating jobs, and making products that benefit residents (RYAM 2024a). As plans for the expansion move forward, RYAM has pledged to provide further information to the public and plans to maintain its commitment to the community for years to come (Roberts 2024).

² An area of non-attainment refers to an area that exceeds EPA air quality standards for pollutants. Concurrently, an area of attainment refers to an area in compliance with EPA air quality standards for pollutants.

FERNANDINA PULP AND PAPER MILL: THE HISTORIC PHYSICAL PLANT

The Fernandina Pulp and Paper Mill is in a central area south of the Amelia River and west of the town of Fernandina Beach (**Figures 1–2**). Marshland abuts the parcel to the south. According to 1944 topographic maps, the oldest buildings on the property are centered within the facility (US Geological Survey [USGS] 1944). The facility grew rapidly between the earliest available topographic maps, dating to 1944, and the earliest available aerial photograph, dating to 1947 (Florida Memory 1947; USGS 1944). By 1944, there were 21 buildings and two rail spur lines within the plant's boundaries (USGS 1944).



Figure 1. Rayonier, Fernandina ca. 1947 (Florida Memory 1947).

Construction continued throughout the decades at a slower, steadier rate; few new buildings were built before construction stopped in 1974 (Nationwide Environmental Title Research [NETR] 1974). As of 2024, there are 18 historic buildings (i.e., buildings older than 50 years) within the facility. Buildings in the eastern section of the parcel that were present in 1944 topographic maps are no longer extant; however, the plant continued to grow westward and southward as needs of the plant changed over time (NETR 1999; USGS 1944).



Figure 2. Rayonier, Fernandina ca. 1968 (Florida Memory 1968).

The ca. 1939 main office of the Rayonier plant is south of the cluster of processing facilities. The building is a simple, unadorned, L-shaped Masonry Vernacular office (**Figure 3**). The exterior walls comprise concrete blocks covered with smoothed finish stucco. Frosted glass block windows line the northwestern and southeastern facades. The building contains metal sash and sliding windows arranged sporadically across each facade. The visible entry is a single metal door with 12 rectangular upper lights. Asphalt shingles cover the gabled roof.



Figure 3. Office building, facing east.

The largest historic building houses paper-processing equipment (**Figure 4**). Auxiliary buildings, such as machine shops and storage facilities, are scattered throughout the plant. Each processing facility was constructed in the Industrial Vernacular style because each was constructed as a “response to the functional needs of the operations they housed and seldom were influenced by design innovations or stylistic movements” (Ochsner 2019). The buildings at RYAM were constructed during a time where function was prioritized over form. The construction styles of



Figure 4. Concentration of processing buildings.

the buildings were purpose driven, emphasizing the importance of their function and the equipment they house. Most of the utilitarian buildings have a rectangular plan, but a few have L-shaped plans and are clad in sheet metal or concrete blocks.

The pulp-processing procedures at the facility are largely the same as they were at the plant’s construction. Most of today’s processing, including digesting, bleaching, forming, drying, pressing, and winding, happens in the machinery and appurtenances developed and installed in 1939. Though electrical and safety improvements were added to the historic machines over time, they convey the long history of Rayonier at Fernandina Beach.

One of the first steps to produce cellulose-based products is to break down a long log into chips before digestion, which is what converts wood chips into pulp. By the time the mill was constructed, chemical digestion (versus mechanical digestion) was the industry practice. During chemical digestion, wood chips are combined with chemicals such as sodium hydroxide or sodium sulfide to extract cellulose by dissolving lignin, a substance that binds wood fibers together. Chemical processing pulp, the method used at Rayonier, extracts a higher quality of cellulose than mechanical pulping (Hiziroglu 2016). One of the earliest buildings on the property,



Figure 5. Interior of digester building.



Figure 6. Interior of screening and bleaching building.

a ca. 1939 building centered within the parcel, houses the digester and associated tanks (see **Figure 4**; **Figure 5**). The original vertical digester tanks are outside the building. Once digested, the pulp is pumped to the screening and bleaching facility through a series of pipes that are also original to the facility (**Figure 6**).

Bleaching pulp involves the removal or decolorization of lignin (US Congress, Office of Technology Assessment 1989). Though much of the lignin is dissolved during the digestion phase,

lignin remains a major constituent of pulp. Harsher, longer digestion processes will remove more lignin; however, the cellulose molecules and bonding power may be further degraded, compromising the strength of the final product. Bleaching allows for the removal of the remaining lignin while protecting the integrity of the cellulose molecules, thus creating a stronger final product (US Congress, Office of Technology Assessment 1989). Once the bleaching process is complete, the pulp is transferred to a connecting building for forming, pressing, and drying via exterior conveyor belts within a rectangular, metal shaft.

The pulp is formed before being fed into a pressing and drying machine that ends with large rolls of material (see **Figure 7**). The machines used to make these large parent rolls of material are also original to the 1939 mill. After a parent roll is created, the material is transferred to the winder building to the north. The winder converts large parent rolls of material into smaller roll sets. Additionally, the winders cut and trim sheets before feeding them into a final section where they are wound into cores (Hiziroglu 2016). Finally, the winding machine feeds a single parent roll into four levels of winders, producing four additional rolls from a single parent (**Figure 8**). The rolls are the final product prepared for shipment. The winder machine was shipped from Rayonier's facility in Port Angeles, Washington, in the late 1930s. Like the machines from the previous steps, the winder machine is still in use and well-maintained.



Figure 7. Forming and pressing machine.

The plant utilizes both water and rail for the transportation of raw materials and products. The rail line was constructed in 1939 and connects to the former Seaboard Air Line. The Seaboard Air Line remains in operation under CSX Transportation Corporation. The rail lines lead into the parcel and end along the southern side of the digester building, allowing for easy unloading of processing materials, including chemicals necessary for the digestion process. The single-gauge rail line within the



Figure 8. Winder machine.

facility is still utilized to import and export materials from the facility. Additionally, the line has been expanded to the east and connects to other processing buildings, as well as a small storage yard.

The site features a ca. 1939 warehouse constructed over the Amelia River, providing additional methods for materials to come in and out of the plant (**Figure 9**). It was likely built as part of the company's significant war effort to get critical wartime materials overseas as quickly as possible, capitalizing on the already busy Fernandina Harbor (USGS 1944).



Figure 9. Waterway Warehouse, facing east.

The rectangular-plan building is set on concrete pilons within the Amelia River. The construction of the warehouse over the water and not along the bank of the river was likely to account for the for the depth the barges require to dock at the plant while fully loaded with materials. Directly south of the water warehouse is a ca. 1939 packing and storage warehouse. An additional water warehouse was constructed sometime between 1960 and 1974 and acted as a connector between the two building (NETR 1960, 1974).

The RYAM facility at Fernandina is a representative of the history of industry in Florida, particularly the pulp and paper industry. The facility played a significant role in the production of pine pulp products within the southeastern United States, leading the region to outpace production elsewhere in the nation. Functionality was, and remains, a focus during the construction and continued expansion of the plant. RYAM has preserved and updated its buildings, allowing the facility to exhibit its mid-twentieth century industrial construction style.

Additionally, the historic-aged manufacturing machinery in the plant conveys the significance of industrial development in Florida. RYAM continues to play an important role in Florida industry by finding more ways to utilize all parts of the trees that are the key raw materials to their pulping process thus expanding their manufacturing capabilities within the historic context of their Fernandina Beach facility.

CONCLUSION

Since its establishment in the late 1930s, RYAM's Fernandina Beach facility has been a bedrock of economic development and employment for Fernandina Beach. Throughout the twentieth century, the plant has played a role in supporting the local economy, developed and implemented new manufacturing technologies, supported American wartime efforts, and developed and adopted environmental measures to support a green future. As of 2024, the RYAM plant employs more than 300 people and contributes \$35 million to the local economy through its wages and salaries (RYAM 2024b). Today, RYAM continues to advance environmentally friendly manufacturing technologies through its planned implementation of a 2G BioEthanol process, helping ensure this historic operation's viability, continued support of the Fernandina Beach economy and community for years to come and ensuring both the facility's and Fernandina Beach's role in finding ways to reduce reliance on fossil fuels.

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