

Railroading of Phosphate

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Agrico Chemical Company, a leading phosphate producer and processor in Florida's Bone Valley area, is the proving ground for a new manual door operating system which Ortner Freight Car Company has developed for its Rapid Discharge[®] aggregate car. Dubbed the Versalok[®], the new system enables one man to open and close a Rapid Discharge[®] car's doors from either side of the car with a simple twist of a spud bar.

Fifteen Versalok[®]-equipped cars went into service in January 1981, supplementing the 215 "wet rock" hoppers that Agrico already owned. Although the company's involvement with railroading is no longer as heavy as in the time when it had an interest in the old Charlotte Harbor Northern, there is still a significant commitment to rail transportation on Agrico's 65,000-acre site.

In addition to the 230 wet rock cars, Agrico owns 13 locomotives and maintains 63 miles of track, 21 miles of which is 115-pound welded rail. The rail system and equipment fleet are the largest owned by any phosphate operation in the area. While other companies in the area marshal cars for the Seaboard Coast Line with random manpower, Agrico has five specific railroad crews on duty per shift, 30 men every 24 hours. It also has its own set of railroad rules and regulations to follow.

With its historical founding in railroading, it was natural for Agrico to expand its inplant system as mining operations gradually stretched further from the main drying and blending area at company headquarters in Pierce. The SCL moves the company's products from Pierce to the Port of Tampa, but Agrico still has plenty to handle between the far-flung mines of Payne Creek, Fort Green, the chemical works at South Pierce, and the drying operation at Pierce (Figs. 1, 2 and 3).

The feed requirement at the South Pierce Chemical Works alone keeps three 20-car trains in operation 24 hours a day, 365 days a year. The trains bring various blends of phosphate from Pierce and the washers to the chemical works where the major product is granular triple superphosphate.

An expansion at the chemical works prompted the purchase of the new Ortner Rapid Discharge[®] cars. The 45 cars already in this service were 70-ton converted hoppers, and the initial plan was to purchase more of the same. But a thorough study revealed that for about the same price as for the re-

Fig. 1: Wet rock is loaded into Rapid Discharge[®] cars at the Ft. Green washer



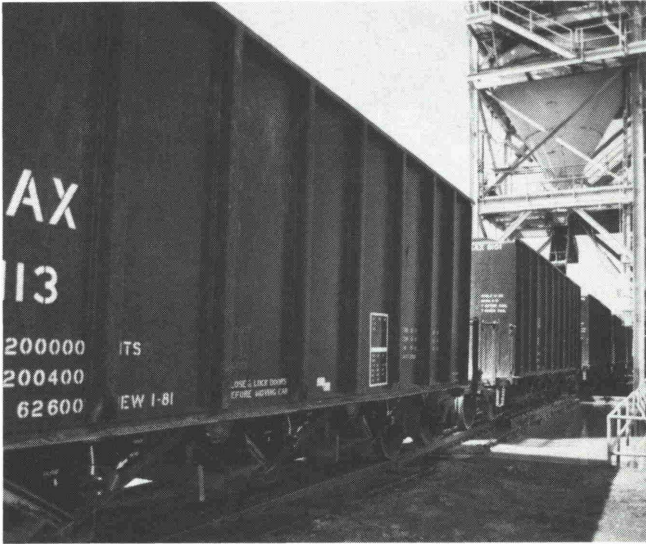


Fig. 2: Wet rock is loaded into Rapid Discharge® cars at the Ft. Green washer

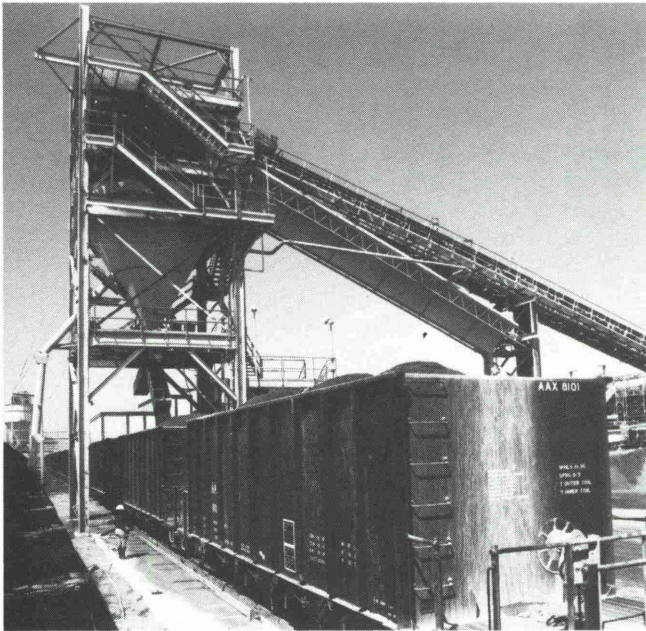


Fig. 3: Wet rock is loaded into Rapid Discharge® cars at the Ft. Green washer

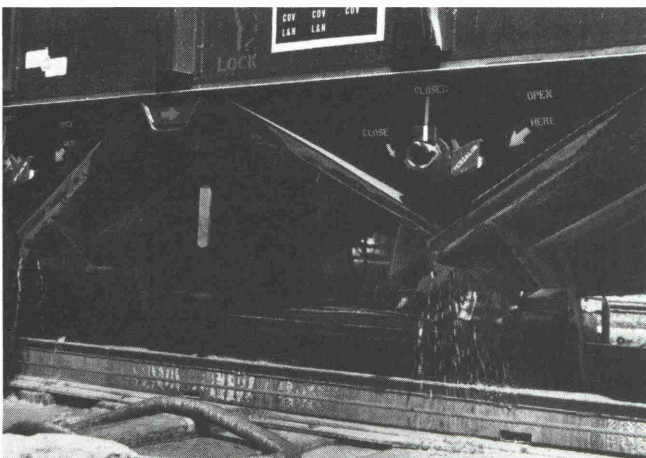


Fig. 4: The Rapid Discharge® cars are equipped with drain panels and special door seals which allow water to drain freely without loss of phosphate in transit

quired 70-ton cars, 15 new Rapid Discharge® cars could be purchased. According to Agrico, these cars were chosen because of their superior bottom unloading capability, good sealing properties, and ease of operation with Ortner's newly developed Versalok®. With the Rapid Discharge car, the company got the capacity it needed, with fewer cars that have a longer life span. Maintenance would be low and utilization high, exactly in keeping with the company's operating philosophy (Fig. 4).

The Rapid Discharge cars are unloaded over a hopper at the South Pierce Chemical Works. A conveyor beneath the hopper moves the phosphate to several storage bins (Fig. 5).

The Versalok® has proven very handy in this service. It allows one man to operate all the doors on the car from either side of the car. Agrico reports that it is simple and secure. Safety is important, too. An operator's hands never have to touch the doors or dog down latches, and there is no lifting or pulling involved. The door lock is released with a simple turn of a handle, and a 60° rotation of a spud bar opens the doors. Inserting the spud bar in the locking hub and rotating it in the opposite direction closes the doors. Turning the lock handle down to its original position secures the door operating mechanism in its over-center position (Fig. 6).

The Rapid Discharge cars are equipped with drain panels and special door seals which eliminate the possibility of loss of phosphate in transit, but allow much of the water to drain from the rock. The cars have proven well suited to handling "soupy" phosphate concentrate.

Up until late 1980, the uses for railcars at Agrico or any other phosphate operation were limited to handling wet rock and concentrate produced by the washers. This was dictated by the nature of the mining plan. Agrico's Fort Green mine is typical. This multi-million dollar washer, capable of processing 3 million t/year of washed and graded phosphate, is centrally located in an area of significant reserves. Draglines, as far away as five miles, strip the overburden and bring the matrix (20—35% phosphate rock, 20—30% clay, 20—40% quartz sand) to the surface and deposit it in a slurry pit. The matrix is slurried to 25—35% solids with high pressure water and pumped via pipeline to the washer. The cleaned, raw phosphate is loaded into railcars at the washer for delivery to customers.

In late 1980, Agrico embarked on a plan to mine its small, short-lived reserves and haul the matrix to an existing washer by rail instead of pipeline. This saves the cost of building a new washer for small reserves and extends the life of those that may be destined for shutdown.

Agrico is currently mining some of its small, scattered reserves in the East Palmetto area of its Payne Creek mine. A dragline removes the matrix from cuts 270 ft wide and up to one mile long and stacks it in a windrow next to a spur of panel track. Three payloaders with 7.5yd³ buckets put the matrix into the railcars.

Agrico purchased 75 converted hopper cars from Ortner for this service and uses them in trains of 25 cars. The dragline and rail spur start at the far end of a cut and are gradually backed out, with the panel track being "leap frogged" over to the next cut as the dragline mines its way back out the length of the cut. Payloaders have proven to be the best method for handling the matrix, and they also serve in moving the 4-ton sections of panel track. About one mile of track is moved every 60 days.

Agrico designed a special matrix unloading hopper at its Payne Creek washer to handle the railcars (Fig. 7). The matrix is blasted out of the cars with two remote-controlled, moveable hydraulicking guns. The material hits a grizzly below the car where it is slurried with a third gun, picked up by a pit pump, and piped to the nearby washer (Fig. 8).

Although the initial cost for the 9-mile matrix rail system was higher than a slurry pipeline, the operating costs are lower. The actual figures are proprietary to Agrico. However, the basic factors included the comparison of rail locomotives, cars, labor and fuel versus pumps, electricity, and pipeline. A typical slurry pipeline uses pumps of about 16", spaced about 2,800 ft apart, and driven by 1,000 + HP motors. Elec-

tricity costs are very high in Florida, so pump operation is a heavy expense. The spiral welded pipeline costs about \$ 25 a foot, and it has a life span of about two years. During that period, it must be rotated five or six times so that it wears out evenly from the abrasion on the interior. This takes more manpower and special machinery.

Agrico emphasizes that although it is still in the learning phase with its matrix haul, the preliminary performance has been promising. Other companies in the area are watching closely, too. The system will be improved over time. When Agrico decides to make a full commitment to hauling matrix by rail, Ortnor will be ready, too, with a new matrix Rapid Discharge car that is now in the design stage.



Fig. 5: At the South Pierce Chemical Works, one man can unload a car from either side. Each doorset is locked and unlocked with the yellow handle. The doors are then opened with a simple turn of a steel bar inserted in the locking hub.

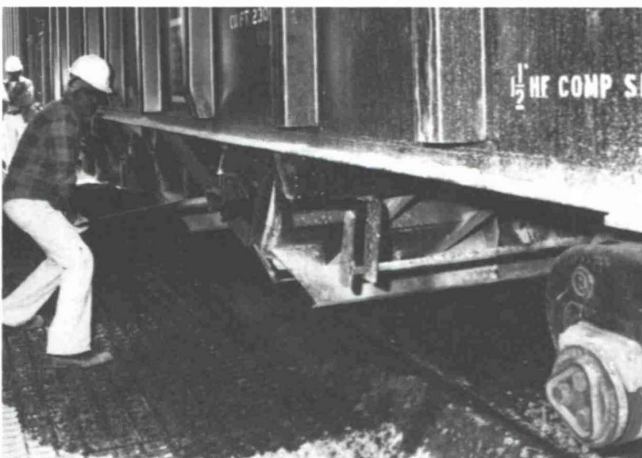


Fig. 6: The steel bar is inserted in the locking hub and rotated in the opposite direction to close the doors. The yellow lock handle is then returned to its original "down" position



Fig. 7: Matrix from short-lived reserves is delivered to the Payne Creek washer in converted hopper cars. They are unloaded at a special matrix unloading hopper designed by Agrico. The car doors are opened over the hopper, and the matrix is blasted out of the cars with two remote controlled, moveable "hydraulicking" guns. The material hits a grizzly below the car, where it is slurried with a third gun, picked up by a pit pump, and piped to the nearby washer

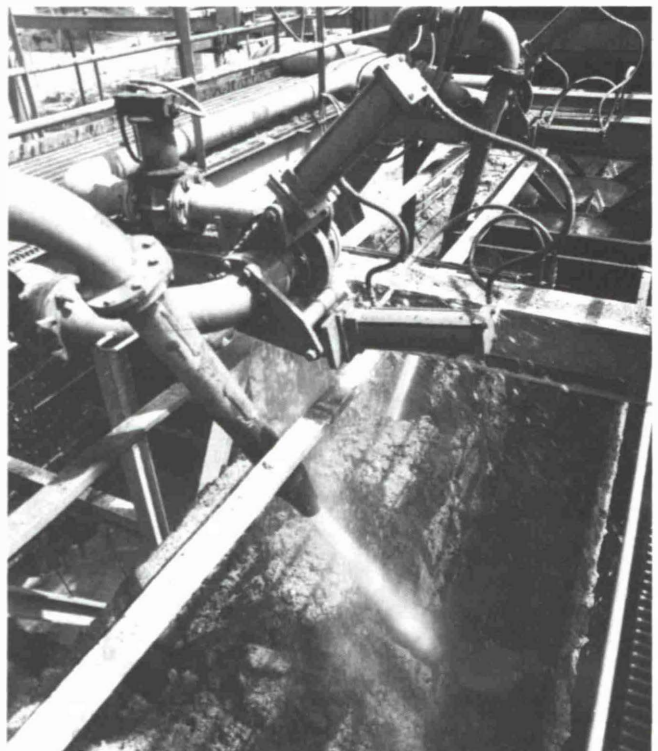


Fig. 8: A view of the hydraulicking guns cleaning out a car from above