track suited exactly the period at which we originally wanted them to report. At the top of the chart will be seen a set of symbols which indicate the following: black, that man was laid off for dirty coal, the length of line indicating the number of days he was to be off or when he could be expected back; red, that the miner was off sick or injured, blue, that he was off for some unknown reason. When a miner reported at his place for work and the mine foreman or an assistant placed him as a substitute on some other job, such as brakeman, trackman, or timberman, this was marked opposite his number in yellow. There were occasions when a man was laid off for some reason that did not fall within our symbols. When this occurred we wrote opposite his name the reason he was laid off or stopped work.

In the actual operation of this chart, after every one got used to doing his part, the management in the general office knew before nine o'clock the total number of men available for loading coal that day. They knew the available number of men for loading coal that day long before the mine foremen. It was soon learned that there was a great discrepancy between the number of miners reported in and the number of miners available for loading coal. This was information that had not heretofore been available because it had always been impracticable to get.

This information was of valuable assistance in setting standards. Standard here means the expected production of a miner; of a section; of a gathering unit, and finally, the expected production of a mine. To illustrate how closely it was possible to estimate the standard or expected production, after a little practice we could estimate within a few tons the mine output and do this for a mine with a production averaging from 900 to 1,100 tons per day. The same thing applied to the number of cars hoisted.

The mine foreman and superintendent were, of course, responsible for the day's output. They were expected to come up to a standard in their production. But the thing that appealed to them was that our standard was thorough, because it was based upon actual conditions; a mine was not charged the equivalent tonnage of one man when he was not available for loading coal. After the chart had been in operation a week an allowance was made for miners who were loading rock. This information came directly from the miner, and the mine was charged only the actual number of cars of coal that the miner would load that day. For instance, if the standard for one place was ten cars per day and the miner working there found himself in a clay vein, then, after he had reported on how long it would take him to handle the rock, allowance was made for this. In other words, he was not charged ten cars per day, but probably three or four, and often times none. We never had to set a standard of production and then wonder why it was not reached. This occurred when, let us say, one hundred men who went into a mine averaged ten tons per day and 1000 tons were expected for the day. When only 900 tons came out of the mine we were at a loss to know what had happened. No specific information could be secured from the mine foremen. They would give the obvious explanation, that there had been a wreck or a cave. When nothing extraordinary had happened, however, during the day, even he was at a loss to explain why the production was only 900 tons instead of 1,000. With the use of the chart we never had to ask, because we knew.

Another thing that appealed to the management during this work was the opportunity for increased production per man. It costs the management a certain amount per man to keep a man at work and every ton that a miner can load and does not is a direct loss to the company. The chart pointed out a new field for increased production per man and guided movements toward greater efficiency. For instance, we were able to pick out all the low producers. The next thing was to find out why a man was a low producer. It costs just as much in overhead to keep a low producer in a place as it does a high producer. The output of the low man is so much higher in cost per ton than that of the fast man, and is reflected in the ultimate cost per ton.

It was a common complaint of the miners in every district, and this district was no exception, that they were not allowed to make big earnings because they could not get cars. I can cite instances where stragglers would come out of the mines at noon, one o'clock, two o'clock or three o'clock, and if they were asked why they would invariably say that they could not get cars. It was known that they were low producers but no records had been available heretofore for disproving their statements.

We had also the problem of grievance committees that took up with the management cases growing out of poor car supply, and, what is worse, of unequal supply. The management then had to face charges not only of inefficiency, but also of favoritism. The unfortunate part of such cases was that there were no records to refer to, and the only evidence that could be presented was the word of the miner and the word of the mine foreman, with the result that the man deciding the case took his choice. After the chart was put into operation it was an easy matter to file it at the end of the month and there was no longer any comeback, as the number of cars that were offered to a miner and the number of cars that he actually loaded were recorded on the chart.

The motorman on his first trip up the heading places, let us say, two cars. It is a custom for the motor crew to examine every place in its heading each morning to see if the men are at work and what they are doing. Our inspection, therefore, did not put any extra work upon them.

Let us cite the motorman's first report in the morning. It would read somewhat as follows:

Left sidetrack 7 A. M. with thirty empties. Check No. 601, placed two and pulled two; Check No. 602, not in; Check No. 603, not in, sick; Check No. 604, not in, brakeman today; Check No. 605, placed four cars; Check No. 606, clay vein two hours, no cars until noon; Check No. 607, placed two cars and pulled two; Check No. 608, track torn up by cutting machine two hours; Check No. 609, placed two cars; Check No. 610, placed two cars. Arrived at side track 8:10 A. M. with thirty loads.

The report given here is, of course, an assumed one, but it shows the wide range of flexibility, and the number of varying conditions that can be covered by a few symbols, such as "clay vein, two hours," and so on. The loaded trip report would be made up of the cars loaded early in the morning and those placed the night before, including loads left over from the night before. These reports were posted directly to the chart by the man receiving them from the motorman. He used a telephone with the transmitter and receiver on a single unit, which left his other hand free to make such notations as were necessary. It was intended later to get this man a head set, such as is worn by telephone operators and train dispatchers, in order that both of his hands might be free.

We now come to the haulage division of this chart. The first column is Heading Symbol. Under this was put the number of the entry or heading which a gathering locomotive served. This agrees with the heading symbol used on the miner's division of the chart. Next comes the motor number and the names of the crew. The space given to the motorman is divided as follows: Miners In, Loads Pulled, Loads Cumulative, Standard Expectation.

The division of the column under the date is the same as the miner's column; that is, it is divided into four equal sections, each of which can either represent two hour periods, or the trips handled during the day. This can be arranged for the convenience of the one handling the chart. It will be noted all the way through that this chart is flexible enough so that it can be changed to suit conditions obtaining in one or any number of sections. Of course, uniformity is desirable, but so is convenience and efficiency.

The motorman, within a few minutes after giving his first report to, let us call him the production manager, knew his standard expectation for the day. This standard was not based on the total number of miners in his section, but upon the men available for loading coal that day. One thing that the motorman liked in this connection was the fairness upon which this standard expectation was based. In other words, he was not charged full tonnage for miners who were doing track work, rock work, or had bad roof to handle. The man who handled this chart and received these reports from the motormen was experienced in the mines and familiar with all conditions. Another feature that was brought out during this work was that no cars should be delivered to a miner while he was doing rock work. The production manager knew if cars were placed to this man in the morning. If the motorman happened to leave cars in a man's place, and he was not able to load them, this was known, and the cars were taken out and used elsewhere.

One section of a mine occasionally had an extraordinarily good day, with its full quota of miners in and all loading. Of course, at a time like this, the demand for mine cars was unusual. Now we can assume that in another section probably two or three men were on rock work and a full quota of cars not needed. The production manager, with this knowledge, could allow the extra