The main question that has seemed worth while looking into as regards the three-shift system has been the fundamental question as to what extent if any the greater wage cost due to compromise on hourly wage rates at the time hours are shortened can be offset by increased efficiency; that is, to what extent can the shorter day be made to pay for itself.

A survey of the plants which have been experimenting with three shifts shows that the attainment of this goal is not a simple matter. Most of the people with whom I have talked were ready to agree that as a general proposition—having no special reference to the steel industry—8 hours or 10 hours makes a better day from the production standpoint than 12 hours. Where the amount of work accomplished depends on the energy that a man puts in, it is believed that he will do as much in 8 or 10 hours as in any longer period.[1] But while the steel men feel that this is true in most industries and in a few departments of the steel industry, they do not believe that in the steel industry taken as a whole a day as short as 8 hours can actually be made as productive per man-day of 8 hours as is the present day of 12 hours; for the reason that most of the work around a steel plant is not of a kind that a man can pitch into and get done. He must wait. I found, as a matter of fact, that in almost all cases the three-shift system is being introduced at some increase in cost—that is, in cases where the men do not go on at practically the same hourly wage rates as before. And it seems likely that if all the steel plants in the United States were to go on three shifts a large majority would find that their labor costs had risen.

It is not so certain, however, that this increase in cost would prove to be permanent, at least in its entirety. In speaking of their experience with three shifts, managers have constantly given the warning that conditions have not been normal during the last few years when most of them have made the change, and that it is hard to tell just what would be the results under more favorable circumstances. During a period of labor shortage, when jobs are more numerous than men, it is hard to get men to change their habits, or to do more work, even if the conditions and pay are such that they could well afford to do so. Moreover, most of the plants changed over shortly before or sometime since the steel strike; and, needless to say,

TABLE VIII. CONDITIONS UNDER WHICH THREE-SHIFT SYSTEM WOULD INVOLVE NO INCREASE IN COST OVER TWO-SHIFT SYSTEM

	Changing hours of shift workers from	And increasing men's hourly rates 25%		But taking on only 35 % more men		Would mean a small increase in daily pay-roll for shift men	If daily output is on the average increased 10%	Labor cost would remain practically stationary
		Rate per hour	Wages per day	On a shift	Per day			Per ton
Two-Shift system	12 hours	60c	$7.20	10	20	$144.00	170 tons	$.85—
Three-Shift system	to 8 hours	75c	6.00	9	27	162.00	187 tons	.86+

[1] In the course of this study I have run across two plants, one in the East and one in the West, which have tried Lord Leverhulm's plan of four 6-hour shifts. In both cases the managing heads were enthusiastic over the results; for to their amazement (neither had heard of the other), the men in both cases produced more in 6 hours than in 8; and, considering the fact that both plants had expensive equipment, the saving in overhead was decisive. The achievement is not so incredible as it sounds, for a man can work through a 6-hour shift without any interruption, while during an 8-hour shift he is interrupted and slowed down by at least one meal. The head of the one plant had got much better results on the shift from 12 midnight to 6 A. M. than had been attained on the similar 8-hour shift; while the manager in the other plant had found that during the hot months, when he tried the plan, the proportion of turns when the men did not report for work was greatly reduced. One of these plants was a sheet mill and the other a fabricating plant where welding plays an important part. The managers of these plants would be the last to claim that what had worked out with success in their special departments would work in the steel industry in general, where the jobs consist so largely in simply standing by. Since presenting this paper I have learned of another plant in a metallurgical industry (not iron or steel) in which the men work 6-hour shifts; but the four shifts are divided among three groups. A man works 6 hours, is off 12, on 6, etc. This mutual arrangement was the wish of the men.

that was a very potent source of demoralization. Some of the plants started up operation with an almost entirely new force of men, and it would naturally take several years before such a new force would do as well, other things being equal, as before the strike. Then last summer there was the rail strike, which made operations irregular, affecting the supply of fuel, materials, etc. Comparative statistics are therefore of very little value in many cases; and even the general impression made on the managers, and the reaction upon the men, is not what it would have been under less adverse conditions.

Another important thing to take into account is the fact that in the average steel plant, which makes the change from two to three shifts in a more or less routine way, the economies possible under the system are fairly certain not to show themselves to any great extent at the start. The mere change from 12 to 8 hours in an industry where everything centers around huge machines and furnaces is simply an opening of the door for greater efficiency, not a consummation of it. What is necessary if the industry is really to get what it should out of the shorter day, is a thorough-going reorganization. The occupations must be changed, the spirit of the men, the type of foremen. What the introduction of the three-shift system does is simply to open up a new country. Some gains will come automatically without labor. But before any fair census can be taken of what the new country can produce, it will be necessary to plow the land, put the best kind of seed in the most fertile places, and in general strive for something. The shortening of a man's day from 12 to 8 hours means that the possible energy and attention which he can put into his work in each working hour is greatly increased. But to harness this new energy, as to develop a new country, will take time.

There seems, in fact, to be substantial reason for believing—in view of results already accomplished in some of the plants—that when the three-shift system once gets into fair running order, the labor cost need not be to any great degree higher than it has been under two-shift operation; and, indeed, a rather fair argument might be drawn up to show that all of the increase in labor cost might in time be wiped out. Table VIII is an illustration of a situation under which, if it could be obtained, steel would be made at substantially as low a labor cost under the three-shift system as under the two-shift system. If hourly wage rates are compromised half way, the force of men increased not a full 50 per cent, but on the average 35 per cent, and if output could on the average be increased 10 per cent, then the labor cost under three shifts would be practically the same as under two shifts. If the first figure were 20 per cent, or the second 30 per cent, or the third 12½ per cent—in each case the other two figures being unchanged—there would be no increase at all.[1]

The experience of practically all the plants which I have visited shows that the wage adjustment specified is a feasible one. Where it is expected that the men will turn out a greatly increased output, or where there is a very material decrease in the number of men, it would be only justice to give the men perhaps as much for 8 hours as they had previously earned in 12. In that case there would of course be no difficulty

TABLE IX. MAXIMUM COST OF INTRODUCING THREE-SHIFT SYSTEM INTO A BLAST FURNACE ASSUMING THAT HOURLY WAGE RATES ARE ADVANCED 25 %BUT THAT THERE IS NO INCREASE IN EFFICIENCY

Total labor cost of making a ton of pig iron	$1.25 a ton
Proportion of labor cost paid to present 12-hour workers (2/3)	.83 a ton
Increase of 25% in pay-roll of shift workers	.21 a ton
Selling price of a ton of pig iron	$40.00 a ton
Cost of ore required to make a ton of pig iron (2 tons ore)	16.00 a ton
Maximum cost of abolishing 12-hour day (assuming no increase in efficiency or elimination of jobs)	.21 a ton

[1] I wish to make it clear that this table does not represent the *average* accomplishments of the 20 plants. The figures were selected to show what would be necessary to eliminate all increase in cost; and we then go on, in the paragraphs that follow, to consider how closely these figures can be and are approximated.