A similar control chart can be developed to evaluate the significance of changes in work-injury experience The first step in developing the chart is to calculate the average number of injuries per month. Because this monthly average will fluctuate from year to year, several year's experience should be used to develop a stable average Ideally, the average should be calculated using 60 months' experience After the average number of injuries per month has been determined, the upper and lower control limits are calculated using the following equation

$$n \pm 2\sqrt{n}$$

where n is the average number of injuries

Fig 9-7 shows a control chart developed for the XYZ Company Using 60 months' experience, it was determined that the company had an average of 25 injuries per month Substitution of 25 for n in the equation yielded the upper and lower control limits shown below

$$25 \pm 2\sqrt{25} = 25 \pm 10 =$$

$$\begin{cases} 25 + 10 = 35 \text{ Upper limit} \\ 25 - 10 = 15 \text{ Lower limit} \end{cases}$$

The control chart was then constructed and the XYZ Company recorded the actual number of injuries each month Note that the actual monthly number of injuries, with the exception of February, fall within the upper and lower control limits These variations are random and do not represent significant changes from the monthly average of 25 injuries The variation for February, however, is a caused variation indicating that the injury experience for February is "out of control" and that corrective measures should be taken Suppose, for example, an investigation revealed that an unguarded machine was the cause of the increase in injuries for the month of February It can be assumed that the installation of a mechanical guard corrected this cause and brought the work-injury experience for March back "in control"

The control chart can be a useful tool when it is used properly. As with any tool, it will depend on the skill of the user to yield good results Follow these rules when constructing a control chart

1 Always use several years' experience when calculating the average number of injuries per month to assure that a stable average will be developed Sixty months' experience is preferable, except as noted in (3), (4), and (5) below

2 Count *all* injuries when constructing a control chart The use of disabling injuries alone may not provide enough data A control chart cannot be constructed if the average number of injuries per month is *less than four* because the lower limit will be negative Since a plant cannot experience a negative number of injuries per month, a chart based on an average of less than four would not yield meaningful results

3 Calculate a new average each year to reflect any change in the monthly average number of injuries

4 Construct more than one chart if there are seasonal changes in employment For example, if an operation employs one hundred people for the first 6 months of each year and four hundred people for the last 6 months, a separate chart must be constructed for each 6-month period

5 Construct a new control chart if external factors, such as a change in the level of employment, a change in the work environment, or a change in work hazards, bring about a permanent change in work-injury experience When calculating a new average in such a situation, *do not* use experience prior to the change

References

American Standards Association, 10 East 40th St, New York City

American Standard Method of Recording and Measuring Work Injury Experience Z16 1—1954 (R1959).

American Standard Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries Z16 2—1962