signs, or ask the workman to display such marks. He should not even allow it to be evident that he is making such observations, but at the same time there is abundant reason why he should keep alert to any indications that a workman may have been exposed to conditions sufficiently adverse to leave a mark or sign. In this way it may be possible to find a serious exposure that might otherwise be overlooked because of the intermittent or obscure nature of its causation. Chapter XV discusses at some length the visible signs of industrial diseases, and their possible significance, and points out as well many nonindustrial causes producing similar signs.

Frequently there are contributory operations, or intermittent operations, not in evidence at the time of the survey. These may include preliminary treatment of raw materials, disposal of by-products or waste products, and warehouse operations. The surveyor may learn of these through his experience in the industry, from a knowledge of similar operations, or by an extended discussion with a competent guide. He should always inquire into the location and method of conducting operations of such a nature, as well as into proposed new operations or pilot plant work, where such exist. A most important thing for the surveyor to remember is not to hurry, or be hurried, through a plant but to take sufficient time to give opportunity for recognition of the more obscure situations.

The preliminary survey should determine the presence or absence of control measures, and provide an opinion as to: (*1*) the probable need for, or effectiveness of, control; (*2*) the type of personnel as regards training, skill, or care; and (*3*) the attitude of management, supervising staff, and workmen toward health-control measures. At the end of the preliminary survey it may be desirable to give the management a report of findings and plans. Where an investigational survey is to be made without delay, it may not be necessary to discuss the situation with anyone other than the guide. In any case, having completed the preliminary survey, and decided where all investigations are to be made, the surveyor now selects the necessary equipment and undertakes the final survey.

C. THE INVESTIGATIONAL INDUSTRIAL HYGIENE SURVEY

1. Surveying the Plant

The investigational, or detailed, industrial hygiene survey involves the evaluation of all harmful exposures and the development of control measures. This is what is ordinarily referred to in the profession as an *industrial hygiene survey*. If no previous survey has been made of the plant, it is best to leave any equipment in a safe place and conduct a preliminary survey before undertaking the detailed investigation. It is frequently unnecessary to evaluate exposures by exact measurements. When control is the only objective, and it is obvious to the investigator that contaminants are excessive, he frequently can devise satisfactory control without the benefit of quantitative measurements.

However, when there is any question as to the necessity of control, or when

facts for record are desired, samples of the atmosphere must be collected and evaluated. In surveys to determine the merits of a claim for compensation for injury allegedly arising from harmful exposure in industry, it is frequently necessary to obtain quantitative information about exposures in order to establish facts, rather than opinions, even though to the industrial hygienist the exposures may be obviously either insignificant or excessive. Records of periodic analyses of the extent of atmospheric contamination in any potentially harmful atmosphere are particularly valuable in evaluating claims presented for occupational diseases alleged to have developed over an extended period of time. In a potentially harmful situation, even though the investigator is completely satisfied that control is ample, sampling may be desirable for its psychological effect: it eliminates personal factors and gives the employees assurance of a safe environment.

The evaluation survey can well be accomplished with the co-operation of the production superintendent, the safety engineer, or the foremen of the particular departments in which investigations are to be made. If the results are to be representative, any air sampling or other quantitative measurements should be made during normal, as well as the most unfavorable, operating conditions and over a sufficient period of time to yield the complete exposure picture. The foremen can assist in maintaining these conditions; and precautions should be taken to avoid arousing the employees' curiosity, not only because of the false conditions created when workmen stop to watch or intentionally produce unnecessary air contamination, but also because it may precipitate ill will between employees and management if the impression is given that *harmful materials* may be present in the atmosphere. Since it is a practice in certain industries to pay a bonus for work in hazardous atmospheres where control of atmospheric contamination is difficult, industrial hygiene surveys there should be a matter of routine. If the plant has a physician or a nurse on duty, it is a good policy to visit him or her in order to establish cordial co-operation and to review any records of ill health. The plant physician may wish to accompany the hygienist during his survey of the plant, and this may prove advantageous to both, but it is an exceptional physician who can supply needed information about plant processes.

It is unpardonable conduct on the part of a surveyor to ask an employee a suggestive question such as: Do you feel all right? Do you get sick often? Does breathing this atmosphere cause you any discomfort or irritation? The psychological effects of such questioning, which is only one step short of suggesting to a workman that he is ill, are obvious and undesirable. To some workmen the mere act that tests for air-borne toxic materials are being made may indicate that dangerous conditions exist, and careless remarks of the investigator may grow to alarming proportions and cause needless alarm among the workers. Although management often finds it advantageous to inform employees in advance of the purpose of an industrial hygiene survey, discussion with employees should be avoided by