each factor and combining those scores into an overall index.* In this way, asbestos-containing materials in various locations within a single building or in different buildings can be evaluated and compared. The value of these indices rests on the validity of the assumed relationships between factor scores and actual (or potential) concentrations of asbestos in the air.

Several tests of these relationships have been conducted. The EPA-sponsored study of an urban school district (Constant, et al 1982) is the most recent and comprehensive. Of the various EPA factors which were assumed to be positively correlated with measured levels of airborne asbestos, only two were confirmed: the presence of water damage and the proximity of the material to an airstream created by the ventilation system. For several factors (degree of friability, percent asbestos content, degree of activity), a direct relationship with airborne asbestos was not confirmed. Other factors (accessibility, degree of exposed surface area, condition of the material) did not receive a fair test, typically because little or no variation in scores was observed in the schools. Tests conducted by other investigators (Sebastien, et al 1982 and Pinchin 1982) using combined factor scores (that is, the index values) likewise produced little correspondence between ratings and measured air levels. Tests using the U.S. Navy risk procedure index and the Toronto Board of Education index fared no better (Pinchin 1982).

These findings indicate that numerical ratings derived from subjective assessments of fiber release potential are not reliable indicators of measured airborne asbestos levels. However, selected assessment factors may help identify a high potential for future fiber release. Employed in a qualitative manner, some factors also may help distinguish among major categories of asbestos problems. Selection and use of these factors is discussed in the following section.

### 3.2.2.2 Usefulness of Individual Assessment Factors

The results of the hazard index evaluation studies emphasize the complexity of the fiber release process. Some proposed factors focus on conditions which are necessary but not sufficient for fiber release. A few relate to the probability of release given other necessary conditions, and thus gauge future rather than current problems. Others refer to similar or highly correlated features of asbestos-containing materials and should be combined. As a result, the use of the EPA factors to assess potential fiber release has been re-evaluated.

Table 1 displays the assessment factors judged most useful as a result of this re-evaluation. The first three individual factors focus on the current condition of the asbestos-containing material. If water damage, physical damage, slow deterioration, or delamination of the material is evident, then fiber release has occurred, is occurring, or is likely to occur in the future. Evidence is obtained from the appearance of the material and from the presence of broken or crumbled material on the floor, tables, or other horizontal surfaces. Factors under the second heading reflect the potential for fiber release due to disturbance or erosion. Exposed and highly accessible materials in areas frequented by building occupants or subject to maintenance activities are more vulnerable to physical damage than materials in other locations. In this category are materials subject to vibration from mechanical equipment, sound, or athletic activities. Examples include materials near a gymnasium or band room, or materials in buildings near an airport or highway. Likewise, asbestos-containing materials

*Although the EPA guidance document (USEPA 1979a) does not describe scoring procedures, a scoring routine known as the EPA "algorithm" was developed and appeared in the advance notice of proposed rulemaking for the Asbestos-in-Schools rule published in the FEDERAL REGISTER (44 FR 54676).



405-406 O - 83 - 5 : QL 3