



FIGURE 6.2 Ammonia fill station.

It would be impossible to repeat a full-blown HAZOP here, but this ammonia fill station is a good example to demonstrate the important elements in a HAZOP. It does emphasize various inherent problems found in a typical process unit in a chemical plant.

Most HAZOP entries are not quite so detailed as this one. However, it is worthwhile to go into some detail here to note some of the finer points of HAZOPs. Because the HAZOP is a systematic review of the design and operation, it is also fairly repetitive. Most of the repetition has been deleted here for ease of reading. Table 6.3 is the one summary report sheet (of various) of the ammonia fill station HAZOP.

Upon first reading the summary report, you can immediately see that the HAZOP results have yielded not only safety issues but also operational issues. Also, the HAZOP has indicated various entries that are already well controlled. The *safeguards* column demonstrates the current state of safety in the node. This summary report is very useful in demonstrating to inspectors your thoroughness of analysis and current state of hazard control—various items are already under control, and only some of the items must be taken to disposition.

As you can see, the no/less flow entries are numerous. This proves that there are various ways that flow can be interrupted. This is a critical point in any process plant and one area that is almost always ripe for close scrutiny.

The most important no/less flow entry is 1.5. The distance between the two tanks is one mile. If care were not taken, it would be easy to forget to open one of the control valves while the pump is operating. As stated earlier, when presented with a hazard, the best control is to design it out. Currently, operating procedures control the hazard. Installing relief valves that prevent possible overpressurization does not eliminate the danger but does mitigate the hazard even if the operator fails to open the control valve. Further controls could include control feedback to the pump to shut down if a certain pressure is reached downstream (i.e., the valve has not cycled open).