



Figure 4.1 DAP process schematic for the Checklist Analysis example

Example

A proposed continuous process is shown in Figure 4.1. In this process, a phosphoric acid solution and an ammonia solution are provided through flow control valves to an agitated reactor. The ammonia and phosphoric acid react to form diammonium phosphate (DAP), a nonhazardous product. The DAP flows from the reactor to an open-top storage tank. Relief valves are provided on the storage tanks and the reactor with discharges to outside of the enclosed work area.

If too much phosphoric acid is fed to the reactor (compared to the ammonia feed rate), an off-specification product is created, but the reaction is safe. If the ammonia and phosphoric acid flow rates both increase, the rate of energy release may accelerate, and the reactor, as designed, may be unable to handle the resulting increase in temperature and pressure. If too much ammonia is fed to the reactor (as compared to the normal phosphoric acid feed rate), unreacted ammonia may carry over to the DAP storage tank. Any residual ammonia in the DAP tank will be released into the enclosed work area, causing personnel exposure. Ammonia detectors and alarms are provided in the work area.

A Checklist Analysis is scheduled for the system using a standard company checklist. A sample of the analysis documentation is included in Table 4.10. The appropriate decision makers review the documentation and implement corrective actions to eliminate deficiencies indicated by the analysis.