*for Emission Inventory Preparation*, Volume IV, Chapter 5 (for both civil and military aircraft engines) and the ICAO's *Engine Exhaust Emissions Databank* (for civil aircraft engines only).

#### A5.2.6.5 Engine Type

Potential sources of site-specific data on engine types being tested include airline maintenance, and sampling. If site-specific engine data for commercial airlines is not available but the aircraft operator is known, then an appropriate default engine can be chosen based on the operator's national fleet. Airline fleet data, including aircraft engine model, is published in Bucher & Co.'s JP Airline-Fleets International. If the aircraft operator is not known, default, typical aircraft-engine data is provided in Chapter 5 of EPA's *Procedures for Emission Inventory Preparation, IV: Mobile Source*. For military aircraft, site-specific information on engine types being tested may be obtained from the maintenance personnel performing the testing. Default military aircraft engine data is also listed in the EPA's *Procedures for Emission Inventory Preparation, IV: Mobile Source*.

## A5.3 Non-Combustion Sources

Typical non-combustion stationary and area sources (e.g., fuel tanks, cooling towers, etc.) found at airports are described in the following sections. The methodologies used to calculate emissions from these sources varies depending on the type of source and the pollutant specific to that source.

### *A5.3.1 Fuel Storage Tanks*

Many airports have fuel farms where large quantities of jet fuel, avgas, gasoline and other fuel types are stored in tanks. Fuel storage and handling activities represent sources of evaporative hydrocarbon emissions. Emissions from these sources occur from "breathing losses" (or "standing losses") and "working losses" (or "withdrawal losses").

Breathing losses are the result of the natural expansion and contraction of the fuel caused by changes in ambient temperature and the resultant evaporative emissions escaping from the fuel storage tanks.

Working losses are the combined losses from filling and emptying the storage tanks. Filling causes increased pressure in the tank, thus expelling vapors from the tank. Emptying losses occur when air drawn into the storage tank during fuel removal becomes saturated with hydrocarbon vapors, expands, thus exceeding the vapor space capacity, and is expelled out of the tank. Working losses also occur during the refueling of aircraft and fuel trucks. The level of emissions depend on the type of storage device, the type and amount of fuel stored, transfer and refueling methods, efficiency of vapor recovery and atmospheric conditions (i.e., temperature and relative humidity).

**Table A5-3** (*Evaporative Emission Losses of Fuel Storage Tanks*) summarizes the fuel storage tanks commonly found at airports and the various ways evaporative emissions escape from these sources.