

4.4 RELIEF AND SAFETY VALVES

4.4.1 Design Basis: The performance objective of the relief and safety valves is to prevent over-pressurizing of the reactor vessel. The relief valves also are designed to rapidly depressurize the reactor vessel so that core spray and LPCI systems will function. To achieve these objectives the relief and safety valves were designed using the following bases:

Relief Valves	
Capacity	3,000,000 lb/hr
Pressure Setting	1125 psig
Safety Valves	
Capacity	5,094,000 lb/hr
Pressure Setting	1210 - 1250 psig

The reactor relief valves are sized to rapidly remove the generated steam flow upon closure of the turbines stop valves and coincident with failure of the turbine bypass system. The relief valves have a sufficiently low pressure setting to eliminate the need for safety valve actuation.

The reactor safety valves are sized to protect the pressure vessel against overpressure during (a) a turbine trip from full power, (b) a failure of the reactor relief valves, (c) a failure of the turbine bypass system. The ASME Boiler and Pressure Vessel Code requires that each vessel designed to meet Section III be protected from the consequence of pressure and temperature in excess of design conditions. The USAS B 31.1 Code for Pressure Piping also requires overpressure protection.

4.4.2 Description

The reactor relief valves are electromatic and are actuated automatically on a high reactor vessel pressure or they can be operated manually from the control room. To add additional protection against a small line break, actuation of the relief valves will occur from coincident signals of low water level and high drywell pressure. This additional protection is discussed more fully in Section 6.2.4.

The reactor relief valves are located on the steam lines upstream of the first isolation valve and they discharge directly to the pressure suppression pool. There are two independent sensor systems supplying the signals to all valves to operate and all valves are powered by the same power source which is separate from the HPCI power source.

The reactor safety valves are located on the steam lines inside the primary containment. They are balanced, spring-loaded-type safety valves which discharge directly to the drywell atmosphere. The safety valves are the final protection against overpressurizing the vessel and are sized to prevent

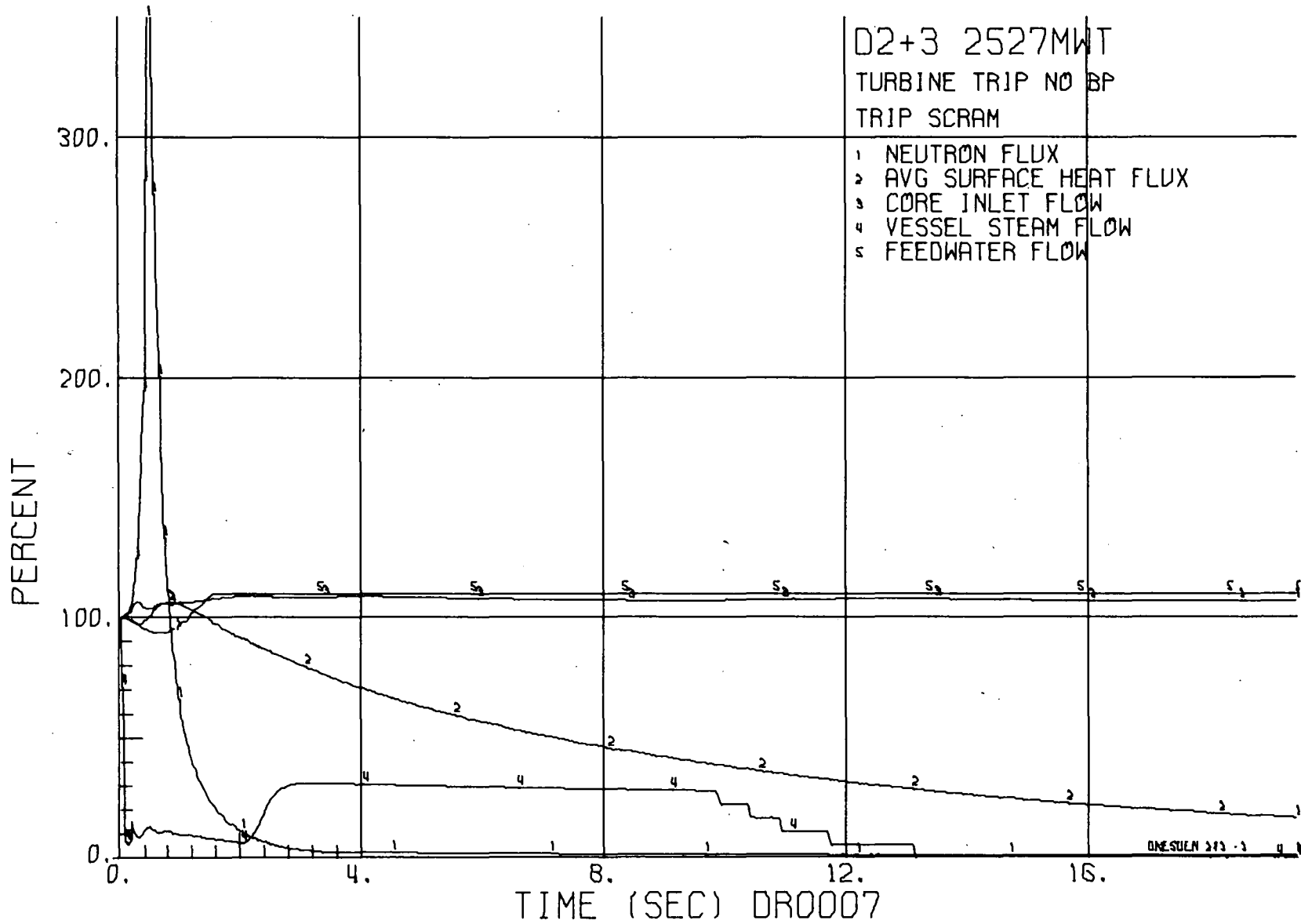


Figure 4.4.1a Turbine Trip, No Bypass—Transient Analysis

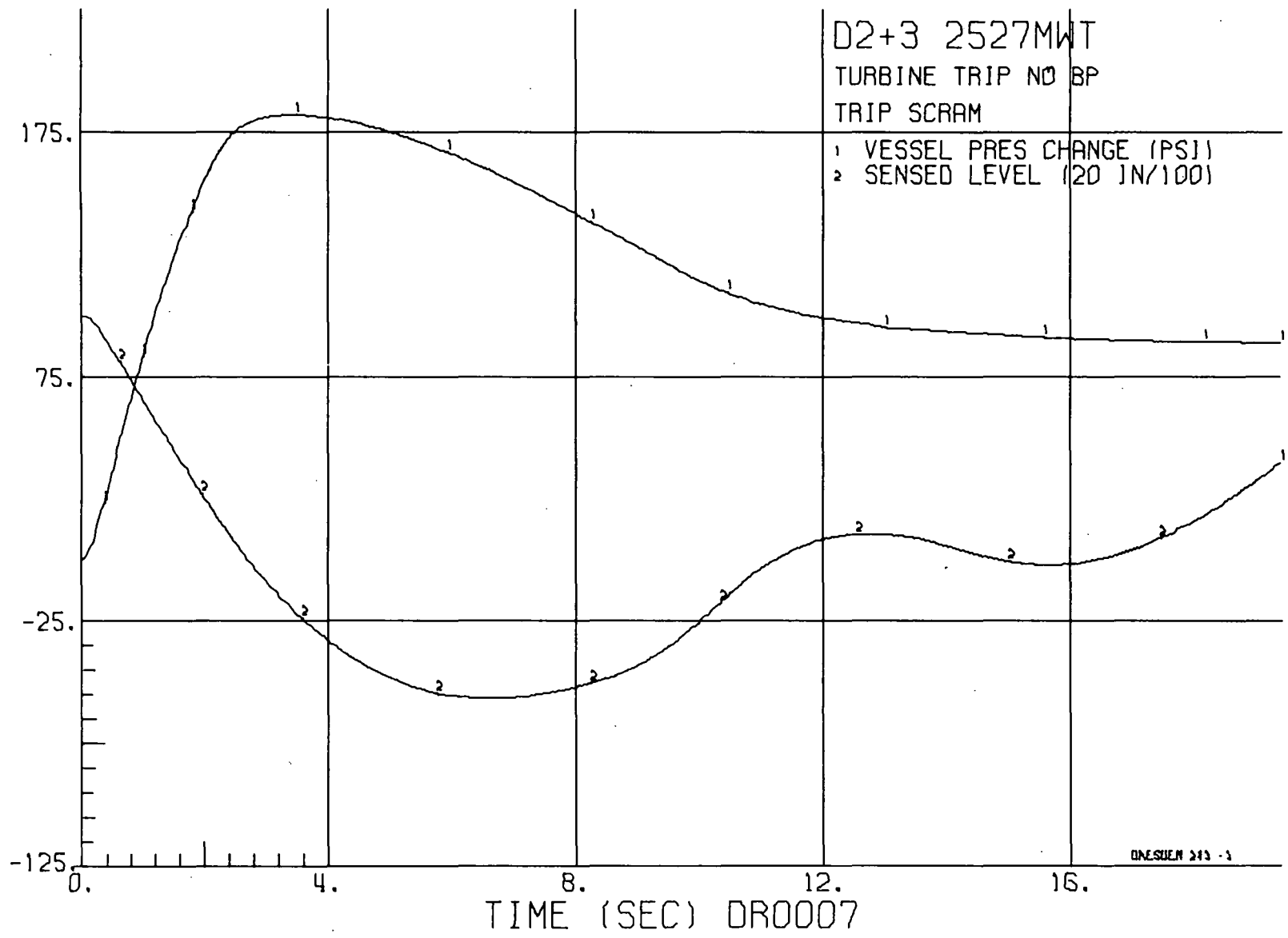


Figure 4.4.1b Turbine Trip, No Bypass—Transient Analysis

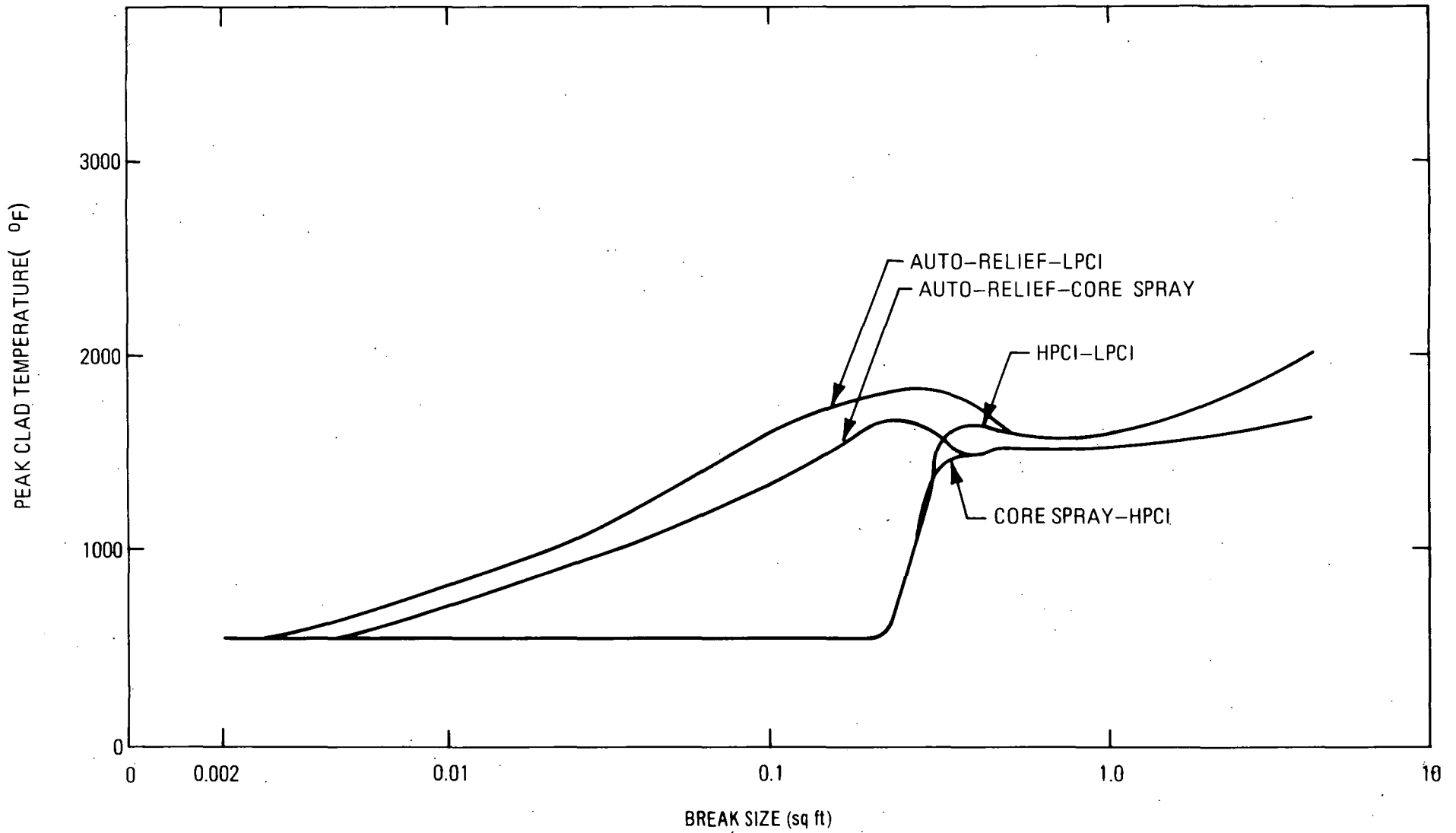


FIGURE 6.2.35 PEAK CLAD TEMPERATURES VS. LIQUID BREAK SIZE

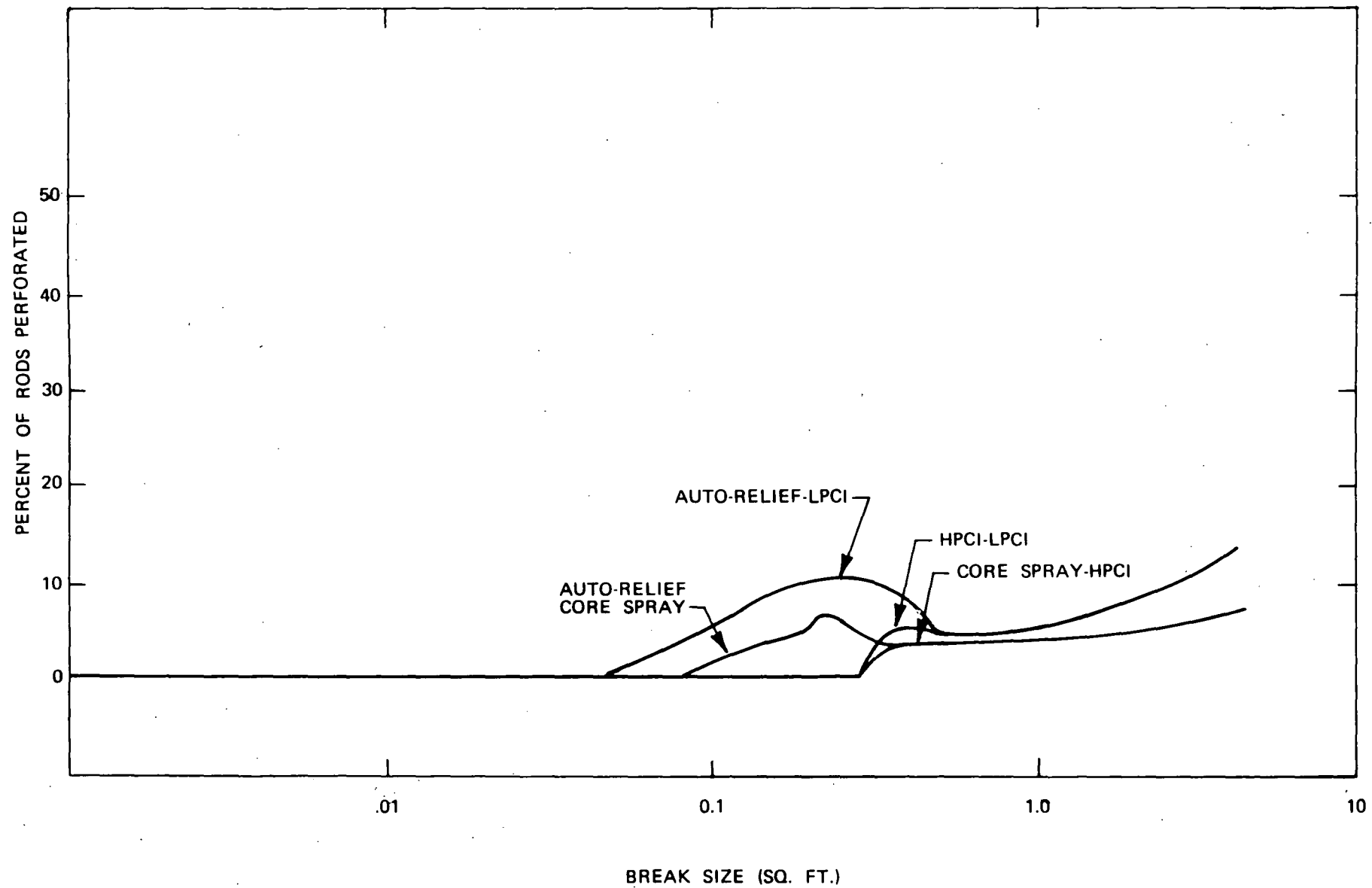


FIGURE 6.2.36 RODS PERFORATED VS. LIQUID BREAK SIZE