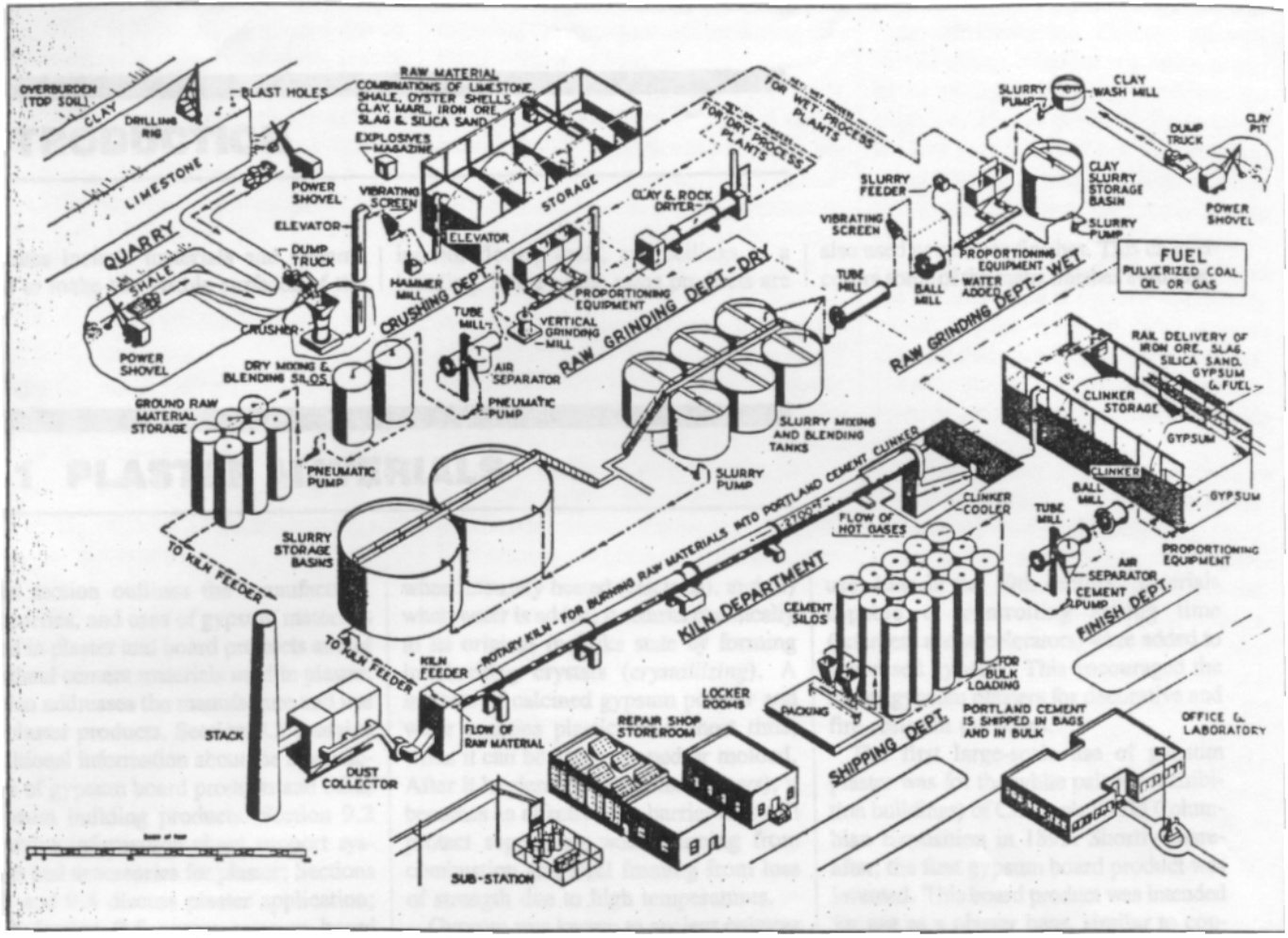

FIGURE 3.2-2 ***Steps in the manufacture of portland cement, showing both dry and wet processes.*** *(Courtesy Portland Cement Association.)*

FIGURE 3.2-3
Portland Cement Types and Uses

ASTM C 150	Use	ASTM C 175
Type I	In general construction when special properties of other types are not required	Type IA*
Type II	In general construction where moderate heat of hydration is required	Type IIA*
Type III	**When high early strength is required**	**Type IIIA***
Type IV	**When low heat of hydration is required**	
Type V	**When high sulfate resistance is required**	

Courtesy Portland Cement Association.
*Air-entraining portland cement.

where sulfate concentrations in the groundwater are higher than normal. Type II portland cement generates less heat of hydration and cures at a slower rate than Type I. This moderate heat of hydration reduces temperature rise, which is especially important when concrete is placed in warm weather in structures of considerable mass, such as in large piers or heavy retaining walls.

■ TYPE III, HIGH EARLY STRENGTH

Type III portland cement is used when high strengths are desired at a very early time, usually in a week or less. It is used when (1) early form removal is desirable; (2) the concrete must be put into service quickly; (3) the weather is cold, to reduce the period required for protection against low temperatures to control curing; and (4) high early strengths can be secured more satisfactorily or more economically than by using richer mixes of Type I portland cement.

■ TYPE IV, LOW-HEAT

Type IV is a special portland cement for use where the amount and rate of heat generated during hydration must be kept to a