THE MUD CIRCULATING SYSTEM

4.1 INTRODUCTION

A typical drilling rig circulating system is shown in Figure 4-1. The mud pumps draw fluid from the suction pit and pump it through the discharge manifolds, standpipe and kelly hose, and down the drillstring. At the bottom of the hole the fluid passes through the bit nozzles before returning up the annulus and through the flowline and shale shakers to the mud tanks.

4.2 THE PUMPS

Oilfield mud pumps are reciprocating pumps in which fluid is displaced by a piston. Single-acting pumps displace fluid on the forward stroke only, while double-acting pumps displace fluid on both the forward and backward strokes. Most oilfield pumps are either double-acting duplex, with two cylinders, or single-acting triplex, with three cylinders. A rig is typically equipped with two or three pumps so that maintenance can be carried out on one pump without interrupting the drilling operation.

A logging geologist must know how to calculate the volumetric output of a mud pump in order to calculate lag time and circulation time. While the pump output is quoted in the manufacturer's literature and available from the driller or toolpusher, it is not always clear what volumetric efficiency is implied by the quoted output.

Volumetric output is expressed as a volume per stroke. A pump stroke is defined as one revolution of the crankshaft, so that each piston of a pump moves once in each direction during one stroke. As each piston moves forward, it sweeps a volume:
Figure 4-1. The Rig Circulating System