

Geologic Site of the Month
March, 2003

Layered Rocks of the Waterville Formation, Central Maine



44 52' 17.53" N, 69 15' 3.43" W

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Introduction

The Waterville Formation is a rock unit that underlies a broad swath of central Maine, from Lagrange southwestward through Corinna and Pittsfield into Waterville and Manchester. It is primarily a dark gray slate or phyllite, alternating with delicate thin layers of light gray siltstone or sandstone. It is the thin light and dark layering that distinguishes the Waterville Formation from adjacent formations.



The Waterville Formation

The Waterville Formation does not generally stand out in prominent cliffs or ridges, so its most common natural exposure is in flat surfaces. The site this month is at a roadside outcrop that was excavated by blasting to give a rare 3-dimensional view (Figure 1). The rock broke along vertical surfaces to expose the slightly tilted layers. Sites like this are very important for geologists to see, and are not improved by burying them with wood chips or hiding them behind trees or shrubs.



Photo by Maine Geological Survey

Figure 1. The three dimensional view exposed by blasting.



The Waterville Formation

A close-up view of the outcrop shows that the rock consists of light and dark layers that are nearly horizontal (Figure 2). These rock layers were originally layers of sediment - mud and silt - that accumulated on the bottom of a narrow sea in the Silurian Period of geologic time. A few fossils have been found in the Waterville Formation, of an extinct form called graptolites.



Photo by Maine Geological Survey

Figure 2. Horizontal layers of light and dark mud.



The Waterville Formation

The rock has split along vertical surfaces, called cleavage surfaces, because the rock has a microscopic fabric, or grain, in that orientation. This feature, called "slaty cleavage" is what allows slate to be quarried and split into large sheets for flagstones or roofing. The rock at this particular outcrop would not be very easy to work with, however, because the layers are nearly perpendicular to the cleavage. Sheets of slate would undoubtedly crack along the layers into small blocky pieces. Notice from the photo that the cleavage runs through all the layers, but curves slightly as it crosses from one rock type into the other.



The Waterville Formation

In side view, looking onto a vertical face, the nature of the layers can be seen (Figure 3). In many cases, the boundary between the layers is sharp, implying that some time elapsed between influxes of sediment. The difference in color reflects subtle differences in the sediment composition, from slightly coarser silt to slightly finer clay particles in the original sediment.



Photo by Maine Geological Survey

Figure 3. Sharp contacts between layers.

