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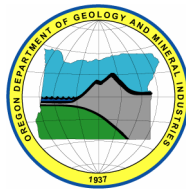
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**PRELIMINARY GEOLOGIC MAP OF THE WIMER AND McCONVILLE  
PEAK 7.5' QUADRANGLES, JACKSON AND JOSEPHINE  
COUNTIES, OREGON**

By

Thomas J. Wiley  
Oregon Department of Geology and Mineral Industries



**2006**

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# **PRELIMINARY GEOLOGIC MAP OF THE WIMER AND McCONVILLE PEAK QUADRANGLES, JACKSON AND JOSEPHINE COUNTIES, OREGON**

**By Thomas J. Wiley**  
Oregon Department of Geology and Mineral Industries

## **INTRODUCTION**

The accompanying geologic map of the Wimer and McConville Peak quadrangles depicts geology along approximately twenty miles of Evans Creek, its tributaries, and adjacent streams including the headwaters of Sardine Creek and Jumpoff Joe Creek. Five miles to the south U.S. Interstate Highway 5 and U.S. Highway 99 follow the east-to-west course of the Rogue River, passing through the Cities of Rogue River and Gold Hill. Valleys shelter small ranches, farms, and low-density rural residential development. Forest lands in adjacent uplands are managed by the U.S. Bureau of Land Management and private timberland owners.

The area is generally mountainous with bedrock geology dominated by Jurassic and older igneous and metamorphic rocks. Valleys are locally filled with Quaternary river deposits and terrace remnants that rest unconformably on bedrock. West of Ditch Creek and the lower reaches of Evans Creek the bedrock sequence is interpreted as dismembered blocks of oceanic, arc, or ocean-island crust. To the east the rocks are interpreted as Jurassic or older meta-sedimentary and metavolcanic sequences. The two older sequences are intruded by the 160 Ma Wimer Pluton.

Earlier geologic maps include those of Diller and Kay (1924), Smith and others (1982), and Donato (1991). In his earlier work on the geology of the Klamath Mountains, Irwin (1966) broke out four fault-bounded stratigraphically similar belts of rock (now known as tectonostratigraphic terranes) and assigned all of the rocks in this area to his western Triassic and Paleozoic belt. Rocks exposed west of Ditch Creek and the lower reach of Evans Creek are similar to the serpentinite-gabbro-diabase-basalt sequence that Smith and others (1982) named the Sexton Mountain Ophiolite. Donato (1991) assigned metamorphic rocks east of Ditch Creek to the May Creek Schist and related mafic amphibolite. Most recently, rocks in this general area have been interpreted as northern equivalents of the Rattlesnake Creek terrane of Northern California (Donato and others, 1996, Irwin 2003, Murray, 2002, 2003).

Contacts along small bodies of serpentinite have been uniformly mapped as faults. Other faults have been mapped where observed in the field or where abrupt changes in geology or terrain suggest a fault must be present. Faults are undoubtedly much more numerous than shown, but are difficult to distinguish from small dislocations that accompanied development of regional metamorphic and intrusive fabrics.

## **EXPLANATION OF MAP UNITS**

### **QUATERNARY**

- Qya    Young alluvium (Holocene)**— Gravel, sand, and silt along channels and flood plains of modern streams.
- Qoa    Older alluvium (Holocene and upper Pleistocene)**—Gravel, sand, and silt deposits outside the limits of modern channels and flood plains.
- Qt    Terrace Deposits (Holocene and upper Pleistocene)** —Gravel, sand, and silt deposits preserved in, or along the margins of, larger valleys. Often blanketed by younger colluvium and small alluvial fans along valley edges. Often overlain by a thin veneer of alluvium along streams.

- Qal Alluvium undivided (Holocene and Pleistocene)** — Undivided deposits of unconsolidated to semi-consolidated sand, gravel, silt, mud, and clay deposited along streams. Less mature sediments with local provenance occur along smaller streams. The provenance contrast between streams on granitic bedrock (dominated by coarse quartz-feldspar sand) and those on metamorphic bedrock (dominated by metamorphic pebbles) is striking.
- Qaf Alluvial Fan Deposits (Holocene and Pleistocene)** — Gravel, sand, and silt in individual or coalescing fan-shaped deposits along valley margins. Typically occur where gradients of tributary streams decrease abruptly at valley floor levels of larger stream. Clasts typically reflect local provenance, angular to sub-rounded grains and clasts are common.
- Qls Landslides (Holocene and Pleistocene)** — Fragments of bedrock mixed with gravel, sand, silt, or clay and displaced downslope by gravity sliding. Includes slumps, earthflows, block glides, debris flows and rockfalls.

#### UNCONFORMITY

#### PALEOGENE

- Tpc Payne Cliffs Formation (middle Eocene)** —Non-marine sandstone, tuffaceous sandstone, siltstone, pebbly sandstone, pebble conglomerate, carbonaceous shale, and coal. No fossils were recovered in the map area. Tuffaceous sandstone, tuffaceous pebbly sandstone, and reworked crystal tuff exposed in the southeastern corner of the McConville Peak quadrangle are included in the Payne Cliffs Formation on the basis of stratigraphic position and the occurrence of similar lithologies in the Payne Cliffs Formation in the Siskiyou Pass area to the south.
- Khss Hornbrook Formation (Lower and Upper Cretaceous)**—Predominantly marine sandstone with lesser siltstone, pebbly sandstone, and pebble conglomerate. Locally fossiliferous. May be non-marine in part.

#### UNCONFORMITY

#### JURASSIC TO TRIASSIC

#### **Sexton Mountain Ophiolite of Smith and others (1982)**

These rocks crop out in the Wimer quadrangle, generally west of Ditch and Evans Creeks. Rocks assigned to the Sexton Mountain ophiolite (Smith and others, 1982) are typically metamorphosed to greenschist, epidote-amphibolite, or amphibolite facies. Amphibolite facies is recognized in coarsely crystalline rocks interpreted to represent deeper crustal levels. Greenschist metamorphism affected fine-grained igneous rocks interpreted as lava flows. These observations are consistent with seafloor metamorphism occurring near a spreading center. However, pillow basalt was not recognized.

- Jv Volcanic rocks (Lower and Middle Jurassic)**— Greenstone, meta tuff, and tuffaceous sedimentary rocks. Contact with unit Js locally overturned west of Ditch Creek. Locally contains talc lenses.

- Js** **Sedimentary rocks (Lower and Middle Jurassic)**—Phyllite and slate with minor psammite and stretched pebble conglomerate. Lenses of meta-chert and tuffaceous sediment occur along the contact with unit JTrb. Conglomerate contains quartzite clasts and may record juxtaposition of ophiolite sequence with rocks to the east. Age based on Pleinsbachian-Sinemurian radiolaria reported by Irwin and Blome (2004) from tuffaceous rocks at a site seven miles to the north in the King Mountain quadrangle.
- JTrb** **Mafic flows and dikes (Middle Triassic to lower Jurassic)** – chemistry and textures suggest original compositions ranged from andesite to basalt, locally porphyritic. Seem to have originated as flows (typical near the contact with unit Js) or shallow(?) dike and/or sill complexes (typical near the contact with unit JTrd). May contain lesser amounts of other metamorphosed volcanic and sedimentary lithologies. Metamorphism is epidote-amphibolite to greenschist facies.
- JTrd** **Diabase, gabbro, and basalt (Middle Triassic to Lower Jurassic)**— typically medium grained, often with mixtures, spheroids, or bands of different crystal sizes, interpreted as complex intrusions, dikes, and/or sills that have experienced greenschist to epidote-amphibolite facies metamorphism.
- JTrg** **Gabbro (Middle Triassic to Lower Jurassic)**—metamorphosed pyroxene and plagioclase gabbro with minor cumulate gabbro near the contact with unit JTrgc. Minor diabase dikes more common near the contact with unit JTrd. Pyroxene largely replaced by amphibole.
- JTrgc** **Cumulate Gabbro (Middle Triassic to Lower Jurassic)**— layered pyroxene-plagioclase gabbro ranges in composition from pyroxenite to anorthosite. Pyroxene locally replaced by amphibole. Typically occurs adjacent to gabbro of unit JTrg and serpentinite.

## Metamorphic Rocks

- sp** **Serpentinite (Triassic to Lower Jurassic)**—serpentinite, steatite, and talc that occur in lenses and bands defining fault zones or as larger blocks. Along Ditch Creek and the west side of the Wimer Pluton, blocks of metasedimentary and meta-volcanic rock are separated by serpentinite/steatite/talc septa, presumably localized along faults. Similar features cut basalt, diabase, and gabbro in the ophiolite to the west. Donato (1991) reports that serpentinite in the northern part of the McConville Peak quadrangle is metamorphosed to amphibolite facies. Some occurrences may be meta-peridotite associated with the deepest levels of the Sexton Mountain Ophiolite.
- JTram** **Amphibolite (Triassic to Lower Jurassic)**—amphibolite schist that crops out east of Ditch Creek in the northwestern part of the Wimer quadrangle. Relationship to other amphibolite units is uncertain.
- JTrm** **Schistose metasedimentary rocks (Triassic to Lower Jurassic)**— Schist of various compositions all having well developed metamorphic segregation banding. Sedimentary and volcanic protolith textures recognized. Occurs near Pyroxenite of Gold Hill, Gold Hill Pluton, Wimer Pluton, and Grayback Pluton. Locally, banding may have developed by extreme deformation of relict phenocrysts, bedding, sand grains, and/or pebbles. Locally includes:  
**plagioclase, biotite(?), +/- talc schist**—interpreted as metamorphosed dacite or as plagioclase rich sedimentary rock with serpentinite lenses that may have been entrained along faults  
**biotite-amphibolite schist**—interpreted as metamorphosed andesite, basaltic andesite, and basalt.  
**Plagioclase, quartz, hornblende, mica schist**—
- JTrq** **Locally quartzose metasedimentary rocks (Triassic to Lower Jurassic)**—Mapped polygons encompass areas containing quartzose metasedimentary rocks including recrystallized chert and quartzite as well as quartz-mica schist. However, the bulk of the unit is generally similar to unit JTrm. Includes the following lithologies not mapped separately:

- Quartz, +/-biotite, +/- garnet schist**—interpreted as metamorphosed quartz-rich sedimentary rocks
- Quartzite**—Interbedded quartz sandstone and siltstone with lesser amounts of phyllite/slate/argillite. Also includes laminated and banded quartzite interpreted as metachert.
- Phyllite, and biotite schist**—Fine grained, dark gray to black layered schist interpreted as meta-shale. Locally coarse, granular interbeds are interpreted as meta-sandstone.
- JTras Meta-volcaniclastic rocks and related amphibolite (Triassic to Lower Jurassic)**—interpreted as variably metamorphosed volcaniclastic rocks. Typically contains relict euhedral to subhedral crystals of augite and plagioclase that form angular to sub-angular sand grains and very fine pebbles. Augite is often partly or completely replaced by pseudomorphs of metamorphic hornblende. Includes unmapped sequences of meta-volcanic and metasedimentary rocks and schist.
- JTrv Meta-volcanic rocks (Triassic to Lower Jurassic)**—Flows and of intermediate to mafic composition. Groundmass textures are typically obscured by metamorphism.
- JTra Amphibolite of Donato, 1991 (Triassic to Lower Jurassic)**—mafic amphibolite schist. Commonly with relict porphyroblasts of, or pseudomorphs after, plagioclase and pyroxene. Separated from other metamorphic units to the south by a large south-dipping fault zone. Contains a few thin zones of interlayered metasedimentary rocks in the vicinity of the fault. Metasedimentary rocks south of the fault similarly contain a few thin lenses of amphibolite. Based on relict textures and geochemistry, Donato (1991) interpreted these rocks as a metamorphosed dikes and flows from a marginal or back-arc basin setting. Amphibolite and the fault zone predate Middle Jurassic intrusives. Their metamorphic grade is comparable to that of rocks south of the fault zone and they are assigned a similar age.

## Intrusive Rocks

- KJib Intrusive breccia (Middle Jurassic to Lower Cretaceous)**— felsic hornblende porphyry forms the matrix between blocks, fragments, and "clasts" of adjacent country rock and exotic lithologies. Most xenoliths appear to be mafic and ultramafic rock types.
- KJd Diorite (Middle Jurassic to Lower Cretaceous)**— hornblende- and hornblende-biotite-diorite.
- KJi Granodiorite and quartz-diorite intrusions (Middle Jurassic to Lower Cretaceous)**— hornblende-, biotite-, and hornblende-biotite-granodiorite and quartz diorite.
- Ji Granodiorite and related intrusions (Middle Jurassic)** —felsic igneous intrusive bodies of all sizes. Typically hornblende-biotite granodiorite but also including trondjemite, quartz diorite, and hornblende diorite. Includes the northern part of the Wimer pluton.
- Jd Diorite (Middle Jurassic)**—quartz-poor hornblende diorite phase of the Wimer pluton.

## **GEOLOGIC HISTORY**

The geologic history of the Wimer -- McConville Peak area is obscured by several episodes of faulting, metamorphism, and intrusion. Tertiary rocks underlie about two square miles in the southeastern corner of the area. Late Jurassic(?) felsic plutons occur in the northern and western parts of the area and include the Wimer pluton. Older, poorly dated Mesozoic metamorphic rocks underlie the remainder of the map area. The older rocks have tentatively been divided into four sequences. The westernmost of these is a suite of mafic to ultramafic rocks interpreted to be a partially dismembered block of oceanic, arc, or ocean island crust (Sexton Mountain Ophiolite of Smith and others, 1982). Lithologies present in this sequence include serpentinite, gabbro/diorite, diabase dikes, basaltic dikes, and basalt (Units JTrd, and JTrb). Chert, argillite and fissile metamorphic rocks that could be interpreted as metasedimentary rock appear to be interlayered with mafic lava flows and/or dike/sill sequences in the eastern exposures of the basalt (unit JTrb). The second sequence crops out east of the first sequence and includes fine-grained, fissile chlorite- and talc-bearing schist and amphibolite thought to represent metamorphosed dacitic waterlaid tuff and interbedded tuffaceous sediment (Unit JTrm). The third and easternmost sequence includes interlayered volcanoclastic (Units JTrvs) and siliciclastic rocks (Unit JTrs) metamorphosed to greenschist or amphibolite facies. High grade rocks in this unit correspond to the May Creek Schist as defined by Donato (1991). Rare, poorly preserved radiolaria, conodonts, and mega-fossils (Irwin and Galanis, 1976; Irwin and others, 1978) give Jurassic or older ages for the easternmost sequence. The fourth sequence, consisting of mafic amphibolite, crops out along the extreme northern edge of the McConville Peak quadrangle.

## **NATURE OF METAMORPHISM**

Metamorphic mineral assemblages and the degree to which mineral segregation banding has developed vary according to the chemistry of the protolith. Metamorphic grade generally ranges from greenschist to amphibolite facies. Rocks that crop out east of the Wimer pluton increase in grade from south to north. The highest grades occur in the vicinity of the fault zone that separates mafic amphibolite on the north from quartz-biotite schist on the south. Donato (1991) reported a local granulite-facies mineral assemblage from this zone in the Spignet Butte area.

## **STRUCTURAL GEOLOGY**

The thickness of alluvial and terrace deposits varies widely. Locally, alluvium is as much as 30 meters (100 feet) thick. Elsewhere, the streams flow directly over bedrock.

In the McConville Peak quadrangle sandstone beds in the Eocene Payne Cliffs Formation dip as steeply as 20 degrees. Deformation of the Payne Cliffs predates the 7 Ma andesite of Table Rocks that crops out in the Sams Valley quadrangle to the southeast. That largely undeformed flow forms valley wall terrace remnants and mesas as it follows the Rogue River channel westward from the Cascade Range. For most of its length it unconformably overlies tilted strata of the Payne Cliffs Formation and volcanic and volcanoclastic strata in the western Cascade Range. This suggests that the main channel of the Rogue River has occupied more or less the same position since the middle Miocene. At the extreme western end of the flow, however, flow-top elevations appear to be offset by an up-to-the-west fault. This faulting similarly offsets the contact between the Payne Cliffs Formation on the east and older metamorphic rocks to the west (Wiley and Smith, 1993). Immediately downstream from the fault, the Rogue River leaves the alluviated valley and flows directly on bedrock. Erosion rates of about one hundred feet per million years are based on the age of the flow and its height above bedrock beneath the alluvium at the valley floor. This is considered to be a reasonable rate for downcutting by the Rogue River and its tributaries, including Evans Creek.

Folding of the Eocene Payne Cliffs Formation includes a north-northwest trending anticline that has been mapped in the Boswell Mountain quadrangle to the east (Wiley and Hladky, 1990). Farther north, this fold appears to affect older metamorphic rocks beneath the unconformity (Wiley, 1994). Throughout the region rocks as young as 14 Ma appear to be affected by this folding episode (Mortimer and Coleman, 1984), yet,

over most of its length, the 7 Ma Table Rocks andesite appears to be undeformed. So folding occurred at the end of the middle Miocene or early in the late Miocene.

An earlier episode of north-south to northwest-southeast oriented extension is indicated by a suite of hornblende diorite dikes that cut the older metamorphic sequences. These acicular-hornblende-bearing dikes were not observed to cut the Wimer pluton, but Page and others (1977) show dikes with similar trends that are compositionally similar to the Wimer pluton. Donato (1991) reports that these dikes are metamorphosed to greenschist facies.

Regional north- to east- trending structures and metamorphic fabric obscure many of the protolith relationships. The true degree of deformation is difficult to appreciate. To better understand the geology of this area it is helpful to consider the distribution of quartzite, phyllite, and marble and their relationship to volcanoclastic units. The large expanses of volcanoclastic rock shown on the map include many unmapped lenses of sedimentary rock and contacts between the two units are commonly gradational (interbedded) over tens of meters. Similarly, sedimentary rock units include occurrences of volcanoclastic rocks. In the Gold Hill limestone quarry five miles south of the study area, cobbles, boulders, and fragments of marble are enclosed in quartzite and argillite that occur immediately above the eastern contact with massive marble. This suggests that bedding tops are locally to the east and demonstrates that limestone, quartz sandstone, siltstone, and mudstone were interlayered when they were first deposited. The marble does not appear to be an exotic block relative to the rest of the sequence. While the rocks are extremely deformed, they do not appear to constitute a true melange at the scale of the marble pod in the quarry. To be mapped as melange, the blocks must be much larger, probably as large as the major sequences mapped here.

Rocks mapped in the Gold Hill and Rogue River quadrangles to the south include deformed sequences of volcanoclastic rocks, phyllite, dirty quartzite, volcanic rocks and discontinuous pods of marble (Wiley, 2003). Although metamorphosed to higher grades, the rocks in the McConville Peak quadrangle appear to have similar protolith assemblages (although with less marble) and matching contacts. The transition from north-northeast- to east-striking foliation that occurs in the center of the quadrangle is gradational rather than abrupt (except along Fawn Creek where fabrics are aligned with a fault). A major structural discontinuity was not observed between rocks along the Rogue River and those along Evans Creek to the north.

In the northern part of the McConville Peak quadrangle a shear zone described by Donato (1991) generally separates mafic amphibolite schist on the northern footwall from quartz-biotite schist on the southern hanging wall. Lenses of amphibolite are present in the hanging wall schist and lenses of schist occur in the footwall amphibolite. It is not clear if these lenses reflect variations in the protolith or if they are structures associated with the shear zone. As variations in the protolith they would indicate a transition from mafic lava flows to overlying sediment, with quartz-rich sediment at the interface. The contrast between the competence and potential for compaction of lithologies above and below such an interface would likely result in significant shearing during burial and metamorphism.

The Sexton Mountain Ophiolite shows a west-to-east arrangement of lithologies, with generally coarse crystalline diorite and gabbro grading easterly into diabase and fine-grained mafic dikes and then to fine-grained mafic dikes and flows. This suggests a crustal sequence with an overall eastward dip. The sequence is locally reversed as it is along cross section A-A'. Where present in these rocks, foliation and/or schistosity generally dip eastward. Parts of the sequence may be structurally repeated. The contact between the oceanic sequence and volcanic and sedimentary rocks to the east is faulted.

### **PERMEABILITY AND POROSITY**

Three combinations of permeability and porosity characterize the area: 1) Alluvial sand and gravel including the thick alluvial sequence west of Wimer (see bedrock elevation map), 2) Weathered horizons at the top of the Wimer Pluton and other felsic intrusives, and 3) Fractures in other bedrock lithologies and in deeper, competent parts of intrusions. Local variations in groundwater salinity were reported by home owners. At least one well encountered saline groundwater immediately upstream from an intrusive contact of the Wimer pluton on Evans Creek.



## **ANALYTICAL PROCEDURE**

Dr. Stanley A. Mertzman (Department of Geosciences, Franklin and Marshall College, Lancaster, PA) provided XRF analyses for samples listed in Table 1. Analyses were completed using the following procedures:

The original rock/mineral powder is crushed, using aluminum oxide milling media, until the entire sample passes through a clean 80 mesh sieve. Then, 3.6 g of lithium tetraborate and 0.4 g of rock powder are mixed in a Spex Mixer Mill. The powder is transferred to a 95% Pt-5% Au crucible and 3 drops of a 2% solution of Lil are added. The mixture is then covered with a 95% Pt-5% Au lid (which will also act as a mold), and heated for 10 minutes. After being stirred and thoroughly convected, the molten contents of the red-hot crucible are poured into the lid to cool. A Philips 2404 X-ray fluorescence vacuum spectrometer equipped with a 102 position sample changer and a 4 KW Rh X-ray tube is used for automated data acquisition and reduction. The major elements are determined via this technique together with Cr and V.

Working curves for each element of interest are determined by analyzing geochemical rock standards, data which have been synthesized in Abbey (1983) and Govindaraju (1994). Between 30 and 50 data points are gathered for each working curve; various elemental interferences are also taken into account, e.g.,  $\text{SrK}\beta$  on  $\text{Zr}$ ,  $\text{RbK}\beta$  on  $\text{Y}$ , etc. The Rh Compton peak is utilized for a mass absorption correction. Slope and intercept values, together with correction factors for the various wavelength interferences, are calculated and then stored on a computer.

The X-ray procedure determines the total Fe content as  $\text{Fe}_2\text{O}_3\text{T}$ . The amount of ferrous Fe is titrated using a modified Reichen and Fahev (1962) method, and loss on ignition is determined by heating an exact aliquot of the sample at 950°C for one hour.

Trace element analysis is accomplished by weighing out 7 g of whole rock powder and adding 1 g of high purity microcrystalline cellulose, mixing for 10 minutes, and pressing the sample into a briquette. Copolywax powder is substituted for cellulose when the whole rock  $\text{SiO}_2$  content is >55 weight percent.

Data are reported as parts per million (ppm). The elements measured this way include: Rb, Sr, Y, Zr, Nb, Ni, Ga, Cu, Zn, U, Th, Co, Pb, Sc, Cr and V. La, Ce, and Ba amounts have been calibrated using an L X-ray line and a mass absorption correction.

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The views and conclusions contained in this document are those of the authors, and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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