DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY

Tscs Slate and phyllite with less than 20 percent small sandstone and semischist phacoids -

PERIPHERAL ROCKS

slate and phyllite - Sandstone similar to sandstone in unit Tsc

Thick-bedded sandstone and semischist in coherent packets with less than 20 percent

Tectonic breccia — Slate and phyllite with abundant small (1-10 cm) phacoids of

Mostly sandy siltstone, mudstone, and silty sandstone - Bluish-gray, weathering to

light brown, micaceous, carbonaceous siltstone, massive to poorly bedded with local

concretionary layers and very fossiliferous. Very fine to fine-grained silty, lithofelds-

Mostly silty sandstone with minor siltstone and conglomerate - Bluish-gray, weathering to orange brown, fine- to coarse-grained, lithofeldspathic sandstone, well sorted, well

rounded, and friable; it is locally micaceous, carbonaceous, and contains small logs

and large concretions. Bedding is massive to indistinct; there is some crossbedding.

Mostly conglomerate and conglomeratic sandstone — Granule to pebble conglomerate with well-rounded and well-sorted clasts of basalt, indurated sandstone, argillite, and

Sandstone, conglomerate, and minor silty sandstone - Medium- and light-gray to blue-

gray, fine- and medium-grained sandstone, very thick bedded or massive and poorly

sorted with abundant crossbedding and penecontemporaneous slump structures. Car-

bonaceous fragments and thin stringers of coal are common; some of the latter were

Mostly siltstone with some sandstone - Dark-gray, weathering to chocolate brown, car-

bonaceous and characteristically micaceous sandy siltstone; pencil joints common

grained, silty, micaceous, feldspathic sandstone; carbonaceous and massive to well

Conglomerate with minor sandstone and siltstone – Poorly sorted, well-rounded pebbly

to bouldery conglomerates with clasts of basalt, argillite, limy concretions, and hard,

Upper member, massive to thin-bedded mudstone and siltstone - Olive-gray to greenish-

gray mudstone, claystone, and siltstone are poorly indurated and contain thin beds

of calcareous claystone and a few thin to very thick beds of massive calcareous sand-

stone. Spherical, cylindrical, or irregular-shaped calcareous concretions common

Massive greenish-gray siltstone and mudstone and medium-grained sandstone beds

Lower member, thin-bedded sandstone with minor siltstone - Greenish-gray, fine- to

Conglomerate – Massive conglomerate is composed of subangular or subrounded

Sandstone - Light-gray, fine-grained lithic sandstone is thin bedded and contains

siltstone interbeds (Brown and Gower, 1958, p. 2510). Includes pebbly sand-

Sandstone, siltstone, and mudstone undifferentiated – Includes lithologies simi-

medium-grained lithic sandstone, well bedded, well indurated, and calcareous in part.

Siltstone is olive gray. Channel deposits of conglomerate and pebbly granule sandstone

pebbles and cobbles of varied lithology in a matrix of coarse-grained to granule sand-

stone. Locally includes sandstone and pebbly sandstone. Basaltic debris is common at

the base of some conglomerate lenses where it forms a basal breccia (see also Gower,

lar to unit Ttru, Ttrm, and Ttrl. Section exposed on the east in the Snow Creek area

Tuffaceous mudstone, siltstone, and sandstone – Gray, weathering to yellow brown,

massive mudstone and siltstone; locally interbedded with thin beds of sandstone

stone at the base is thick bedded to massive and calcareous. Some sandstone com-

posed predominantly of glass shards, some glauconitic. Limy concretions are com-

to orange brown, medium- to coarse-grained feldspathic sandstone; thick bedded

Conglomerate – Thick bedded to massive, pebble to cobble conglomerate. Lithology

(Brown and others, 1956, p. 103) and the matrix contains considerable phyllite

(Pisciotto, 1972, p. 33). Chert, felsic and mafic volcanic rocks, and intrusive rocks predominate in the Mount Zion area and the matrix is richer in slate and volcanic

clasts (Pisciotto, 1972, p. 33). Generally a ridge-former, although it includes thin

Sandstone and minor siltstone - Fine- to medium-grained, olive-gray to gray lithic sandstone, thin to thick bedded, and subangular to subrounded (Brown and others, 1956, p. 105). Near Maynard, thick-bedded volcanic lithic sandstone is angular,

Hornblende andesite flows, tuffs, and breccias - Gray, weathering to reddish brown, hornblende andesite porphyry flow on Mount Zion; it is altered to iron oxides, chlorite, and minerals similar to montmorillinoid minerals. In Gibbs Lake area

composed of andesite flows, tuff, and breccia with crude columnar jointing locally

Breccia and conglomerate — Similar to unit Tlc but poorly sorted. In the Cape Flattery

area unit has many angular boulders of phyllite, metatuff, porphyritic dacite, and

dark quartz diorite (Ansfield, 1972, fig. 49). At Point of the Arches and south of

Portage Head, unit is rich in diorite and gabbro of unit Jp. At Abbey Island, con-

tains more numerous clasts of altered basalt than elsewhere but is included in this

Siltstone, minor sandstone, and conglomerate — Greenish-gray to medium-olive-gray

siltstone, regularly bedded and alternating with fine-grained dark sandstone. Calca-

Thin-bedded, fine- to medium-grained calcareous sandstone with cut-and-fill struc-

Volcanic rocks in unit Tal - Pillow basalt, breccia, and tuff similar to unit Tcb

Siltstone and sandstone of the Wynoochee-Humptulips area — Light-gray to buff siltstone and micaceous silty sandstone, laminated to thin bedded and with some

Sandstone and siltstone between Waatch Point and Bear Creek – Similar to parts of

Basalt, massive flows, pillows, and breccia; minor diabase and gabbro - Basaltic rocks

are gray, green, and brown, less commonly black, weathering to dark brown and light

green; dense to highly vesicular; contain clinopyroxene (rare titanaugite) and soda to

calcic plagioclase microphenocrysts in a matrix of chlorite and(or) montmorillonoid

minerals and rare brown glass. Alteration minerals in groundmass vesicles and veins

are calcite, zeolites, prehnite, and pumpellyite. Pillows and tube structures are com-

separate pillows and pillow fragments in a tuffaceous matrix. Shears and fractures

are common. Gabbro and diabase, probably occurring mostly as sills, are composi-

tionally similar to basalt but with subophitic or hypidiomorphic granular texture.

Basalt flows and mudflow breccias – Basalt is black, commonly weathering to dark

Unit includes minor red limestone and chert, and on Striped Peak, altered dacite and

greenish gray and brown; contains clinopyroxene and plagioclase, chiefly labradorite,

as phenocrysts in matrix of rare brown glass and alteration minerals, including chlor-

locally are columnar jointed, or more rarely pillowed. East and northeast of Hump-

tulips, basalt is highly weathered to clays. Unit includes many unmapped interbeds

of sedimentary rocks (unit Tcs), some with gray foraminiferal limestone; interbeds

especially abundant between Humptulips and the South Fork of the Skokomish

Basaltic conglomerate, breccia, and minor argillite - Well-bedded to massive red basal-

tic conglomerate and breccia with thin- to thick-bedded brown to purple argillite;

Tcbb and was earlier described by Thoms (1959, p. 15-16) and Allison (1959,

Sedimentary rocks – Thin tongues and isolated lenses of sedimentary rocks in the

Crescent Formation are commonly stratified dark-reddish-brown to green breccia,

Characteristic are red foraminiferal limestones and green to white aphanitic volcanic

rock and (or) chert. Conglomerate clasts are generally diabase and basalt, less com-

and montmorillonoids. Breccia, tuff, and sandstone are commonly graded and have

rare crossbeds and penecontemporaneous slump structures. Basalt flows or breccia

lenses generally pinch out into maroon or green argillite or black volcanic sandstone.

On Striped Peak, includes water-laid rhyolitic to dacitic tuffs and mudflow breccias

Sandstone and argillite - Gray or black, weathering to brown, very fine to mediumgrained lithic sandstone, volcanic rich, rarely micaceous; fair to poorly sorted and

angular with thin to thick beds; graded beds and crossbeds rare. Sandstone contains

rare limestone pods or coaly plant fragments. Argillite is black, weathering to light

or dark brown, with hackly to slaty fracture and grades to siltstone. Unit includes

Basaltic sandstone facies - Similar to unit Tbm but with conspicuous thick to very

thick bedded black, weathering to red, medium-grained basaltic lithic sandstone with

as much as 15 percent rounded clinopyroxene clasts and 5 percent K-feldspar. Thick

Thick-bedded sandstone facies – Similar to unit Tbm but with abundant thick to very

Conglomerate and pebbly sandstone - Predominantly pebbles and cobbles of volcanic

rocks and chert in greenish-gray, weathering to brown, very coarse grained, feldspatholithic sandstone with rare calcareous concretions and abundant shale chip breccia.

Conglomerates are thin to very thick bedded and massive with less than 30 percent

Hornblende microquartz diorite at Point of the Arches - Fine-grained cataclastic to

hypidiomorphic granular microquartz diorite with brown hornblende and minor

K-feldspar. Hornblende quartz diorite and feldspar-bearing peridotite northwest of

Lake Cushman- medium-grained slightly porphyritic, hypidiomorphic quartz dio-

moderately to highly altered to calcite, chlorite, sphene, prehnite, pumpellyite, and

rite with brown hornblende, minor green clinopyroxene, and abundant apatite;

montmorillonoids. Peridotite contains relicts of olivine and clinopyroxene in a

Sedimentary rocks and pillow basalt - Light- to dark-colored, mostly thick bedded,

fine- to medium-grained, micaceous feldspathic lithic sandstone and dark argillite;

includes a sedimentary breccia of thick-bedded micaceous sandstone with angular

clasts up to 15 cm across of shallow marine oolitic, bioclastic limestone, mafic vol-

basalt is composed of a mesh of plagioclase laths with intergranular clinopyroxene

Plutonic rocks - Massive to gneissic pyroxene hornblende gabbro, and diorite partially

altered to uralite, sphene, calcite, chlorite, hydrogarnet, and prehnite; the gabbro

contains tabular bodies of cataclastic epidote-quartz-plagioclase gneiss, irregular

masses of hornblendite with plagioclase relicts and quartz veins and masses

canic rock, slate, coarse-grained calcareous sandstone, and metaquartzite. Pillow

POINT OF THE ARCHES PLUTON AND ASSOCIATED ROCKS

and is locally altered to calcite, chlorite, and pumpellyite

Strike and dip of bedding - Ball on

Strike and dip of foliation

Inclined

Variable

→ ✓ Vertical

strike line indicates top is toward number; top on vertical bed towards

Small s under symbol on map indicates penetrative shear,

but mapped area too small to show dashes

interbeds of black argillite; there are some graded beds and scour structures

beds of black, mica-rich lithic sandstone common locally. Mostly exposed in area

thick bedded or massive, black micaceous volcanic lithic sandstone. Exposed in

rare conglomerate, tuffaceous argillite, and red limestone

between the forks of the Skokomish River

serpentinized matrix with rare labradorite

southern Olympic Mountains.

monly chert and siliceous or limy argillite in a matrix of chlorite, calcite, zeolite,

tuff, and volcanic conglomerate and maroon, green, or black argillite and siltstone

with thin to thick beds of dark fine- to medium-grained volcanic lithic sandstone.

highly weathered except in deep roadcuts. Unit appears conformably to overlie unit

ite, calcite, and zeolites. Flows are characterized by closely spaced, random joints, and

mon, ranging from centimeters to 3 m across; some show budding but most occur as

CRESCENT FORMATION AND THE BLUE MOUNTAIN UNIT.*

reous concretions common; granule microbreccia, pebble, and boulder lenses locally.

crossbedding. Unit contains minor well-cemented conglomerate and limy concretions; locally it is carbonaceous and glauconitic. Includes pebbly mudstone southeast of

unit because it also contains abundant dioritic rocks similar to that in unit Jp

poorly sorted, and commonly rich in glauconite and fossil debris

varies from the northwestern outcrop area to Mount Zion; in the former, well-rounded clasts are mostly argillite, quartzite, chert, metavolcanic rock, and metasandstone

and pebbly conglomerate. Gray to green fine- to medium-grained basaltic sand-

QUIMPER SANDSTONE OF DURHAM (1942) – Dark-brownish-green, weathering

Middle member, massive siltstone, mudstone, and minor thin-bedded sandstone -

contain sporadic concretions and calcareous lenses nearly 2 m thick

Mostly sandstone with some siltstone - Bluish-gray, weathering to light gray, fine-

pathic sandstone is locally micaceous, carbonaceous, and concretionary. Unit contains

Similar to unit Tes

some tuff beds

sheared sandstone and quartz

"Olympic type" [core] rocks

CLALLAM FORMATION

ASTORIA(?) FORMATION

fossiliferous sandstone

TWIN RIVER FORMATION

occur in places at base

stone and conglomerate near Physht

LINCOLN CREEK FORMATION

LYRE FORMATION

sandstone and shale beds

ALDWELL FORMATION

tures locally grades into conglomerate

UNNAMED SEDIMENTARY ROCKS

the Lyre and Twin River Formations

Crescent Formation includes:

other siliceous volcanic rocks

(Brown and others, 1960)

Blue Mountain unit includes:

Locally includes:

DIKES AND SILLS

appears to be predominantly siltstone and mudstone

to massive. Layers of fossil debris and concretions common

MONTESANO FORMATION OF WEAVER (1912)

Unit contains granule and pebble conglomerate lenses

once mined along the coast. Conglomerate is rich in quartz clasts

DESCRIPTION OF MAP UNITS

Qa ALLUVIUM — Sand, silt, and gravel on floors of main valleys and on beaches. Unit

Pont Value YOUNG MORAINE – Mostly barren and uneroded to slightly eroded; deposited by

Unit includes some Olympic drift and Holocene deposits

LANDSLIDE DEPOSITS

GLACIAL DEPOSITS

alpine glaciers

includes small moraines, talus, and landslide deposits; in larger river valleys on

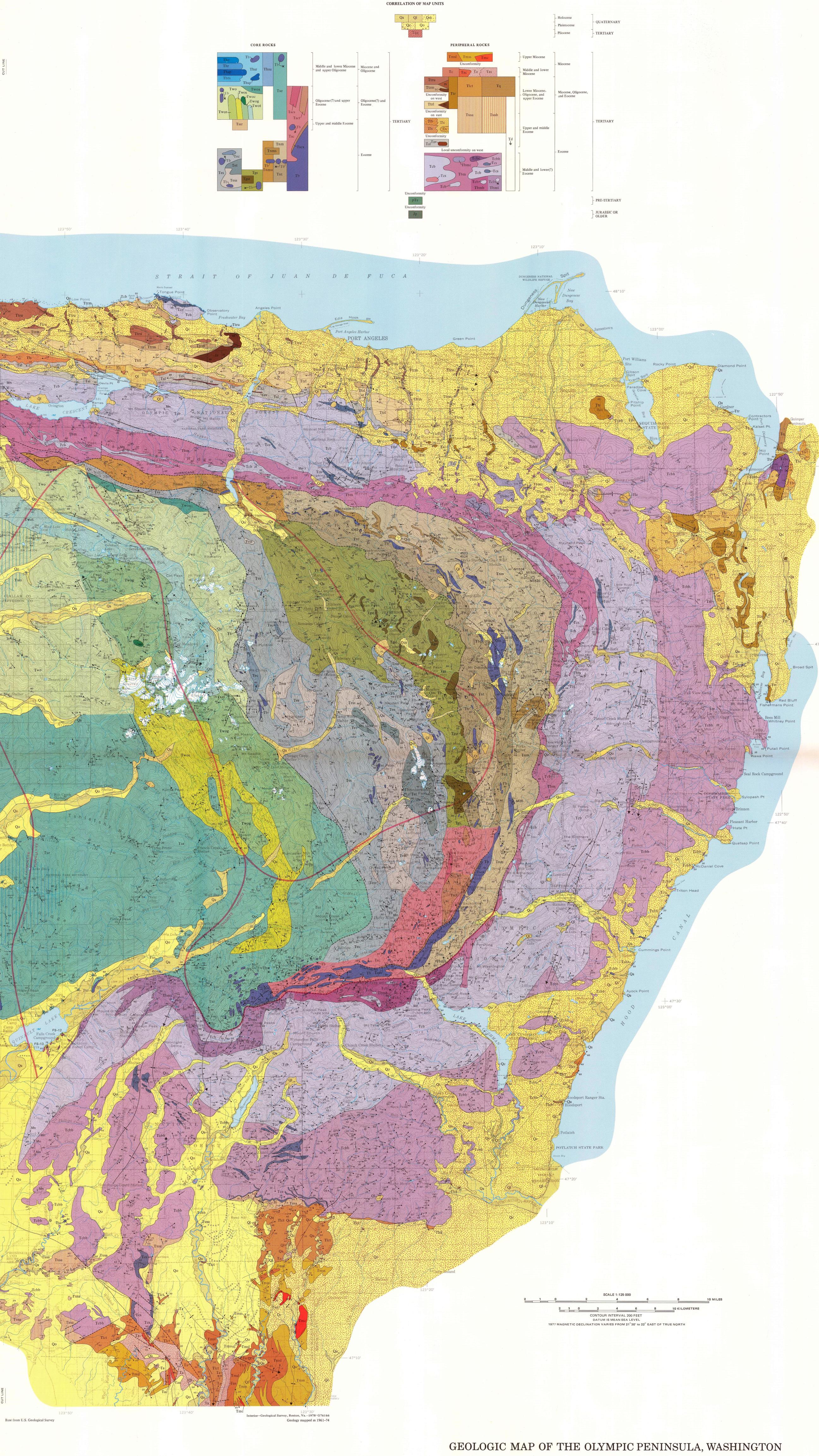
west, includes lower river terraces, some of which may be older than Holocene

Deposits of the continental ice sheet – Moraine and stratified deposits including sand,

gravel, silt, and clay; characterized by rock clasts foreign to the Olympic Peninsula.

MAP I-994

(EAST HALF)



Qo Deposits of the olympic alpine glaciers — Moraine and stratified deposits including sand, gravel, silt, and clay; characterized by clasts derived from the Olympic Mountains. Includes high river terraces along major rivers that may not be directly associated with glaciation QUINAULT FORMATION AND QUILLAYUTE FORMATION OF REAGAN (1909) Sandstone, siltstone, and conglomerate – fine- to coarse-grained, angular, poorly sorted lithic subquartzose (rare quartzose) sandstone is thin to very thick bedded with conspicuous current ripples, cross and graded bedding, flame, scour, and fill structures. Ball and pillow structure, clastic dikes, and intraformational breccia abundant. There are many micro- and macrofossils. Siltstone is thin bedded to massive with concretions and carbonaceous beds **CORE ROCKS** HOH LITHIC ASSEMBLAGE * Siltstone, and thin-bedded sandstone and siltstone in rhythmite sequences – Black to gray, weathering to brown, siltstone, very thin bedded to massive, locally concretionary. Rhythmically bedded fine-grained sandstone is similar to Thts Conglomerate – Generally well rounded and sorted clasts up to 10 cm are mostly volcanic rocks with minor chert and granitoid rock Rhythmite sequences of thin-bedded siltstone and sandstone - Gray, fine-grained sandstone is rhythmically interbedded with siltstone Thick-bedded sandstone and minor thin-bedded siltstone and sandstone - Thick- to very thick bedded blue to gray, weathering to light-brown, fine- to coarse-grained lithic and feldspatholithic sandstone, angular, locally well sorted, and containing scattered coaly debris. Ripple drift cross-laminations, groove, flute, and flame casts are present in thicker beds as well as crossbedding and channels. Some sandstone beds up to 10 m thick although inconspicuously graded have chert and quartz granule conglomerate in lower part; K-feldspar grains in amounts up to 10 percent are common in the East Fork of Kalaloch Creek andstone packets with minor siltstone interbeds and very thick beds of sandstone Commonly very coarse to conglomeratic; similar to sandstone in unit Thts Basaltic rocks - Basaltic breccia with minor massive basalt, pillow basalt, and tuff, commonly altered to greenstone. Unit includes associated red and green argillite Sandstone, siltstone, and conglomerate undifferentiated WESTERN OLYMPIC LITHIC ASSEMBLAGE * Sandstone and minor granule conglomerate with generally less than 40 percent siltstone and argillite; minor semischist and phyllite on eastern margin — Bluish gray to black, weathering to brown, feldspatholithic and lithofeldspathic sandstone, medium to very thick bedded, angular, poorly sorted, commonly micaceous, and locally calcareous. Graded beds with quartz and chert granule conglomerates, sole structures, and crossbedding common. Sedimentary breccias, thin, coaly laminae, and carbonaceous debris ubiquitous on west. Argillite is gray to black, commonly with finegrained sandstone in rhythmic sequences. East of the Soleduck River most of this map unit is a broken formation. In laumontite zone, rocks are characterized by white powdery matrix and veins of zeolite Argillite with limestone lenses and concretions – Black, thinly bedded argillite with coarse-grained black limestone is relatively undeformed Conglomerate – Generally very thick beds contain well-rounded pebbles (up to 5 cm) of chert, quartzite, volcanic rocks, limestone, and sandstone Thick-bedded sandstone with less than 20 percent slate or argillite – Black, mediumto coarse-grained lithic to feldspathic sandstone, thick to very thick bedded with thin micaceous, and commonly highly iron stained; some granule conglomerate. Although there is some local shearing in unit Twot, there is no isoclinal folding except possibly in western belt. Boudinaged beds are minor Greenish-gray and black sandstone and semischist phacoids in less than 50 percent slate and phyllite - Medium- to coarse-grained, lithofeldspathic and lithic sandstone, very thick bedded, angular, poorly sorted, and commonly iron stained; graded bedding common, small scale crossbeds rare. Unit contains sedimentary breccia and granule conglomerate. Greenish sandstone is rich in pumpellyite, epidote, and chlorite; black sandstone is similar but commonly without pumpellyite and rich in calcite. Foliated sandstone and semischist crop out mostly southeast of Dodwell-Rixon Pass. Slate and phyllite are similar to those in unit Tes. Quartz veins with chlorite abundant and commonly vuggy with well-formed quartz crystals. Most of unit characterized by very large sandstone phacoids up to several kilometers long in a completely disrupted slate or thin-bedded sandstone and slate matrix Twos Slate and phyllite with less than 30 percent small phacoids of foliated sandstone and semischist – Slate and phyllite similar to pelite in unit Tes; prehnite and pumpellyite Rhythmically bedded siltstone and sandstone — Thin- to medium-bedded fine-grained sandstone and siltstone similar to those in unit Two Basaltic rocks, greenstone, and greenschist – Includes red argillite and limestone on Tsst SANDSTONE OF THE SOOES RIVER AREA Sandstone - Lithic sandstone, thick to thin bedded, commonly graded and with interbeds of siltstone and mudstone with calcareous concretions, and granule pebble con-JNDIFFERENTIATED ROCKS andstone and minor granule conglomerate with generally less than 40 percent siltstone and argillite - Gray, blue-gray, and black, weathering to light brown, mediumto coarse-grained micaceous lithic to feldspathic sandstone, angular, poorly sorted, commonly calcareous, thick bedded to massive with abundant crossbeds, and graded beds. Sedimentary breccia is rare. Lithic varieties are rich in volcanic clasts. On Matheny Ridge some beds are carbonaceous with leaf prints. Rare rhythmite sequences increase southward. On Matheny Ridge and south of the Stecualeho River, sandstone with 3-10 percent K-feldspar grains is common. Distribution of K-feldspar elsewhere in the western parts of this unit is uncertain due to inadequate sampling, but it is essentially absent in sheared rocks to the east. Siltstone, argillite, and granule conglomerate similar to comparable rocks in unit Two Basaltic rocks — Similar to unit Tb in Hoh and Western Olympic Lithic Assemblages ELWHA LITHIC ASSEMBLAGE * Slate and phyllite with generally less than 20 percent foliated sandstone, semischist, and lineated granule conglomerate – Gray to black, weathering gray to brown, slate and phyllite contains graphite, plagioclase, sericite, chlorite, and quartz; quartz-chloritemuscovite segregations common. Between Long Creek and Quinault River, rocks are locally recrystallized to fine-grained schist with pale biotite. Sandstone, semischist, and granule conglomerate are similar to those in unit Tess. Conglomerate, minor sandstone, semischist, and slate — Matrix and sandstone interbeds are similar to those in unit Tess. On Ludden Peak conglomerate is massive with wellrounded pebbles (up to 5 cm) of porphyry, quartzite, slate, green chert, and aphanitic volcanic rocks. Conglomerates of Mount Childs area similar but with abundant, mostly lineated sandstone and slate. Foliated sandstone, granule conglomerate, and semischist with 10-50 percent slate and phyllite interbeds - Gray, black, or green, weathering to light brown, feldspatholithic sandstone is commonly micaceous, calcareous, fine to coarse grained, angular, poorly sorted and with unstable clasts smeared out and recrystallized. Sedimentary structures less abundant than in adjoining units but thick to very thick bedding is well preserved. Granule conglomerates are gray to green, rich in clasts of quartz, polycrystalline quartz including chert and phyllite, commonly calcareous, strongly lineated, and thoroughly recrystallized. Unmapped granule conglomerates associated with basaltic rocks (Tb) west of Long Creek and on Mount Ferry are mostly composed of mafic volcanic and chert clasts. Most rocks between the Goldie and Quinault Rivers are sericite-chloriteplagioclase-quartz semischist with sporadic pumpellyite and epidote Basaltic rocks including greenstone and greenschist – Light to dark green metamorphosed basaltic rocks contain epidote, chlorite, sodic plagioclase, and actinolite; rarely have pillow structure. Unit includes partly metamorphosed basaltic tuff and breccia, diabase and gabbro, as well as some gray, green, and red limestone. Gabbro and diabase in upper Dosewallips River, east of Hayden Pass, and on Chimney Peak have chilled margins and contact haloes. Northwest of Mount Childs, bedded gray tuff with scattered amygdaloidal basalt scoria is associated with pillow basalt, diabase, and green limestone. Many of the larger basaltic volcanic rocks interfinger with green or gray slate. Small masses of both coarse-and fine-grained basaltic rocks are bounded by faults Thick-bedded to massive, lineated sandstone, semischist, and granule conglomerate -Gray and greenish gray, weathering to red brown, lithic and feldspatholithic sandstone, poorly sorted, and thin to very thick bedded with thin slate interbeds. Polycrystalline quartz pebbles, volcanic clasts, and slate chips form pronounced lineation. Some granule conglomerate has sandstone matrix, some slate and siltstone. Graded beds, load casts, and flame structures are rare. Metamorphic pumpellyite epidote, chlorite, and sericite are abundant and quartz and chlorite veins are common GRAND VALLEY LITHIC ASSEMBLAGE * Sandstone, foliated sandstone, with 40-70 percent siltstone, slate, and minor phyllite – Gray and black, weathering to red, feldspatholithic to lithofeldspathic sandstone, fine to medium grained, angular, with fair to poor sorting, thin to very thick bedding, crossbeds, climbing ripples, flame structure, and load casts. Slate chip breccias, calcareous sandstone, and micaceous sandstone are similar to sandstone in unit Tnm but volcanic-rich sandstone abundant locally. Well-foliated sandstone grades into semischist. Very thick bedded sandstone boudinaged or grades into thin-bedded sandstone and slate. Slates are similar to slates in unit Tnm but contain less visible mica and grade into phyllite; they are highly contorted and rich in quartz laminations and veins. Locally unit contains small pods of gray to black silty marble Thick-bedded sandstone and sandstone packets with thin slate interbeds — Mapped where sandstone is abundant and very thick bedded Basaltic rocks - Includes pillow basalt, sheared basalt, greenstone, and minor red argil-NEEDLES- GRAY WOLF LITHIC ASSEMBLAGE * Micaceous sandstone, with less than 60 percent siltstone and slate – Gray and greenish brown, weathering to light brown or pink, fine to medium-grained lithic to feldspathic sandstone with 5-7 percent detrital muscovite and biotite, and considerable sericite in the matrix. Calcite cement and slate chips common. Sandstone is fair to poorly sorted and angular, with thin to very thick bedding, small crossbeds, and rare graded beds, ripple marks, and load casts. Quartz veining is locally abundant. Foliated sandstone common, with metamorphic calcite, seritice, chlorite, leucoxene, albite and locally epidote and incipient biotite. Black, weathering to silver gray or light brown, slate is micaceous and highly fissile; grades to siltstone. Some cleavage surfaces bear worm tracks or flattened casts of worm burrows Basaltic rocks - Basalt contains phenocrysts of altered plagioclase and titanaugite, rarely oxyhornblende in intersertal matrix, commonly altered to chlorite, sphene, and calcite. It is dense to variolitic or highly amygdaloidal with vesicles filled with calcite, zeolites, pumpellyite, and quartz. Veins of quartz and epidote are common, prehnite rare. Pillows are abundant, breccia rare. Minor diabase and(or) gabbro occurs as sills or dikes. Interbedded tuffs and volcanic-rich sediments include rare gray or red limestone, very rare red and green chert, and tuffaceous green or maroon slate Thin-bedded slate and siltstone, with less than 30 percent sandstone - Micaceous slate is similar to slate in unit Tnm. Northeast of the Lillian River, slate contains basaltic pumice. Lithic sandstone is similar to sandstone in unit Tnm, but rarely thick bedded. It is commonly laminated and calcareous. Unit includes thin beds of green or maroon slate and siltstone Micaceous sandstone and sandstone packets - Mapped separately where outcrops are abundant and (or) thick beds of sandstone are continuous. Units grade laterally to thin-bedded sandstone and slate Micaceous sandstone and slate undifferentiated — Similar to units Tnm and Tnt but without a well-defined volcanic zone or a mappable concentration of thick-bedded sandstone SOUTHEASTERN PART OF THE CORE Sandstone, foliated sandstone, and semischist in less than 50 percent slate and phyllite - Gray to black and greenish-black, fine- to medium-grained lithofeldspathic sandstone, angular, poorly sorted, mostly calcareous, and commonly micaceous; beds are thin to very thick with rare sedimentary structures. Much sandstone is similar to sandstone in units Tess and Tgs Basaltic rocks - Basalt, pillow basalt, basalt breccia, diabase, and gabbro-partly or completely altered to variolitic greenstone with chlorite, calcite, sphene, and relict clinopyroxene. Red limestone and associated manganese minerals are common. Copper and its oxidation minerals (Magill, 1960, p. 64) and quartz veins bearing chalcopyrite are associated with basalt pods on the slopes of Mount Gladys. Contacts are commonly highly sheared, but some diabase and gabbro masses have intrusive con-Penetrative shearing — Density of pattern indicates degree of disruption Dense pattern: complete disruption of bedding: in Calawah fault zone and other zones of western core, pattern represents phacoids of sandstone, conglomerate, and sheared argillite: in eastern core, pattern indicates phacoids of foliated sandstone, siltstone, sheared basalt, and fragmental vein quartz in a matrix of slate and phyllite Open pattern: partial disruption of bedding. Matrix is slate or sheared argillite. Units are broken forma-Note: Some areas along the coast are too small to show the pattern Penetrative shearing in them is indicated by an s below the map symbol ——— Geologic contact — In the area covered by reconnaissance mapping, most contacts are approximately located except for basalt contacts which are well located. Contacts dotted where concealed. For more specific contact information on areas compiled from other sources, see the original sources Fault – Dashed where inferred; dotted where concealed. U, upthrown side; D, downthrown side

Major folds - Trace of axial surface with arrows in direction of plunge. Dotted where concealed 4 Anticline Syncline Overturned anticline Overturned syncline Minor folds - Strike and dip of axial plane and plunge of fold axis Individual folds → 20 Anticline → 35 Syncline Multiple and individual folds Inclined axial plane

20 - Vertical axial plane

Axis unknown

By R. W. Tabor and W. M. Cady

Strike and dip where bedding and foliation are parallel Variable 90 Vertical Strike and dip of bedding in phacoids 80 85 in shear zones Inclined Metamorphic mineral distribution -Based on occurrence of the named minerals in metamorphosed sedimentary rocks and shown only for rocks of the core and the Blue Mountain unit under the Crescent Formation ★ Small pod of basaltic rocks X Mn Mineral prospect – Manganese (Mn) and copper (Cu) o o o o o o o Crest of glacial moraine Macrofossil locality - USGS Menlo Park Cenozoic fossil locality cata-Microfossil locality - Weldon W. Rau Cenozoic microfossil collection laboratory number Note: Fossil localities shown in core rocks only. Other codes refer to the following references: st, Stewart 1970, appendixes 3, 5, and plate 1; FS, Harvey, 1959, appendix A Potassium feldspar occurrence — 3-10 percent K-feldspar in sandstone



