

Metadata:

Identification\_Information:

Citation:

Citation\_Information:

Originator: R.W. Tabor  
Originator: V.A. Frizzell, Jr.  
Originator: D.B. Booth  
Originator: R.B. Waitt  
Originator: J.T. Whetten  
Originator: R.E. Zartman  
Publication\_Date: 1993

Title:

Geologic map of the Skykomish River 30- by 60-Minute  
Quadrangle, Washington

Edition: 1.1

Geospatial\_Data\_Presentation\_Form: vector digital data

Series\_Information:

Series\_Name: U.S. Geological Survey Miscellaneous Investigation Series  
Issue\_Identification: I-1963

Publication\_Information:

Publication\_Place: Menlo Park, Calif.  
Publisher: U.S. Geological Survey

Online\_Linkage: <http://pubs.usgs.gov/imap/i1963/>

Description:

Abstract:

This digital map database has been prepared from the published geologic map of the Skykomish River 30- by 60-minute quadrangle by the senior author. Together with the accompanying text files as PDF, it provides information on the geologic structure and stratigraphy of the area covered. The database delineates map units that are identified by general age and lithology following the stratigraphic nomenclature of the U.S. Geological Survey. The authors mapped most of the bedrock geology at 1:100,000 scale, but compiled Quaternary units at 1:24,000 scale. The Quaternary contacts and structural data have been much simplified for the 1:100,000-scale map and database. The spatial resolution (scale) of the database is 1:100,000 or smaller.

From the eastern-most edges of suburban Seattle, the Skykomish River quadrangle stretches east across the low rolling hills and broad river valleys of the Puget Lowland, across the forested foothills of the North Cascades, and across high meadowlands to the bare rock peaks of the Cascade crest. The Straight Creek Fault, a major Pacific Northwest structure which almost bisects the quadrangle, mostly separates unmetamorphosed and low-grade metamorphic Paleozoic and Mesozoic oceanic rocks on the west from medium- to high-grade metamorphic rocks on the east. Within the quadrangle the lower grade rocks are mostly Mesozoic melange units. To the east, the higher-grade terrane is mostly the Chiwaukum Schist and related gneisses of the Nason terrane and invading mid-Cretaceous stitching plutons. The Early Cretaceous Easton Metamorphic Suite crops out on both sides of the Straight Creek fault and records its dextral displacement. On the south margin of the quadrangle, the fault separates the lower Eocene

Swauk Formation on the east from the upper Eocene and Oligocene(?) Naches Formation and, farther north, its correlative Barlow Pass Volcanics the west. Stratigraphically equivalent rocks of the Puget Group crop out farther to the west. Rocks of the Cascade magmatic arc are mostly represented by Miocene and Oligocene plutons, including the Grotto, Snoqualmie, and Index batholiths. Alpine river valleys in the quadrangle record multiple advances and retreats of alpine glaciers. Multiple advances of the Cordilleran ice sheet, originating in the mountains of British Columbia, Canada, have left an even more complex sequence of outwash and till along the western mountain front, up these same alpine river valleys, and over the Puget Lowland.

**Purpose:**

This database and accompanying plot files depict the distribution of geologic materials and structures at a regional (1:100,000) scale. The report is intended to provide geologic information for the regional study of materials properties, earthquake shaking, landslide potential, mineral hazards, seismic velocity, and earthquake faults. In addition, the report contains new information and interpretations about the regional geologic history and framework. However, the regional scale of this report does not provide sufficient detail for site development purposes.

**Supplemental Information**

**DIGITAL COMPILATION-** The geologic map information was scanned from a stable ink-on-mylar author compilation at 1:100,000 scale. The scanned digital image was used to produce color fill on the Scitex. The digital image of polygons was vectorized and later edited by R.W. Tabor to produce an ARC/INFO coverage complete with faults etc. Structural data was hand-digitized from scanned and georeferenced paper copy of the published map.

The original digital compilation was done in version 7.1.1 of ARC/INFO with version 3.0 of the menu interface ALACARTE (Fitzgibbon and Wentworth, 1991, Fitzgibbon, 1991, Wentworth and Fitzgibbon, 1991). Export files for this release were edited and created in 9.1 ARC/INFO.

**BASE MAP-**The geology of this dataset was mapped on dimensionally stable chronflex prints of the Skykomish River 1:100,000 scale topographic quadrangle. Although no base map material is included in this dataset, a vectorized version of the base can be downloaded from

<http://edcftp.cr.usgs.gov/pub/data/DLG/100K/S/>.

**SPATIAL RESOLUTION-** Uses of this digital geologic map should not violate the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. The fact that this database was edited for a scale of 1:100,000 means that higher resolution information is not present in the dataset. Plotting at scales larger than 1:100,000 will not yield greater real detail, although it may reveal fine-scale irregularities below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data.

**Time\_Period\_of\_Content:**

**Time\_Period\_Information:**

Single\_Date/Time:

Calendar\_Date: 1993 (paper); 2006 (digital database)

Currentness\_Reference: publication date

Status:

Progress: Complete

Maintenance\_and\_Update\_Frequency: As needed

Spatial\_Domain:

Bounding\_Coordinates:

West\_Bounding\_Coordinate: -122.009569

East\_Bounding\_Coordinate: -120.980758

North\_Bounding\_Coordinate: 48.013061

South\_Bounding\_Coordinate: 47.486923

Keywords:

Theme:

Theme\_Keyword\_Thesaurus: none

Theme\_Keyword: alpine glaciation

Theme\_Keyword: Bald Mountain pluton

Theme\_Keyword: Barlow Pass Volcanics

Theme\_Keyword: bedrock geology

Theme\_Keyword: Chiwaukum Schist

Theme\_Keyword: Cordilleran Ice Sheet

Theme\_Keyword: Darrington Phyllite

Theme\_Keyword: Eastern melange belt

Theme\_Keyword: Easton Metamorphic Suite

Theme\_Keyword: Easton terrane

Theme\_Keyword: fault offset

Theme\_Keyword: Fraser glaciation

Theme\_Keyword: geologic history

Theme\_Keyword: geologic structures

Theme\_Keyword: geology

Theme\_Keyword: Index batholith

Theme\_Keyword: Ingells Tectonic Complex

Theme\_Keyword: Mazama ash

Theme\_Keyword: melange

Theme\_Keyword: metamorphism

Theme\_Keyword: Mount Stuart batholith

Theme\_Keyword: Nason terrane

Theme\_Keyword: North Cascades

Theme\_Keyword: Puget Group

Theme\_Keyword: rock samples

Theme\_Keyword: Shuksan Greenschist

Theme\_Keyword: Sloan Creek plutons

Theme\_Keyword: Snoqualmie batholith

Theme\_Keyword: Straight Creek Fault

Theme\_Keyword: surficial geology

Theme\_Keyword: Swauk Formation

Theme\_Keyword: Tenpeak Mountain pluton

Theme\_Keyword: terrane overlap units

Theme\_Keyword: Tonga Formation  
Theme\_Keyword: Western melange belt

Place

Place\_Keyword\_Thesaurus: none  
Place\_Keyword: Skykomish River  
Place\_Keyword: Washington  
Place\_Keyword: King County  
Place\_Keyword: Snohomish County  
Place\_Keyword: Chelan County  
Place\_Keyword: Kittitas County

Access\_Constraints: none

Use\_Constraints:

Uses of this digital geologic map should not violate the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. The fact that this database was edited for a scale of 1:100,000 means that higher resolution information is not present in the dataset. Plotting at scales larger than 1:100,000 will not yield greater real detail, although it may reveal fine-scale irregularities below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data.

Native\_Data\_Set\_Environment: Microsoft Windows 2000 Version 5.0 (Build 2195)  
Service Pack 4; ESRI ArcCatalog 9.0.0.535  
Spatial\_Data\_Organization\_Information:

Spatial\_Data\_Organization\_Information: skygeology is contact, fault, and polygon coverage; skylines is icecap margin, fold axes, and cross section line coverage; skypoints is locations of age samples, fossils, small ultramafic rock bodies, small bodies of limestone or marble and approximate center of morainal embankment; skystructure is structural symbols: bedding, foliation, lineation, and fault balls (These symbols will not show on screen or plot without appropriate symbol sets available in Alacarte); skyrocksamp is a point coverage of rock samples archived at North Cascades National Park, Marblemount. For more information about the rock samples contact the curator at Marblemount, telephone 360 873 4500

Spatial\_Reference\_Information:

Horizontal\_Coordinate\_System\_Definition:

Planar:

Map\_Projection:

Map\_Projection\_Name: Transverse Mercator  
Transverse\_Mercator:  
Scale\_Factor\_at\_Central\_Meridian: 0.999600  
Longitude\_of\_Central\_Meridian: -123.000000  
Latitude\_of\_Projection\_Origin: 0.000000  
False\_Easting: 500000.000000

False\_Northing: 0.000000  
Planar\_Coordinate\_Information:  
Planar\_Coordinate\_Encoding\_Method: coordinate pair  
Coordinate\_Representation:  
Abscissa\_Resolution: 0.000128  
Ordinate\_Resolution: 0.000128  
Planar\_Distance\_Units: meters  
Geodetic\_Model:  
Horizontal\_Datum\_Name: D\_Clarke\_1866  
Ellipsoid\_Name: Clarke 1866  
Semi-major\_Axis: 6378206.400000  
Denominator\_of\_Flattening\_Ratio: 294.978698  
Spatial\_Data\_Organization\_Information: skygeology:  
Direct\_Spatial\_Reference\_Method: Vector  
Point\_and\_Vector\_Object\_Information:  
SDTS\_Terms\_Description:  
SDTS\_Point\_and\_Vector\_Object\_Type: Complete chain  
Point\_and\_Vector\_Object\_Count: 4558  
SDTS\_Terms\_Description:  
SDTS\_Point\_and\_Vector\_Object\_Type: Label point  
Point\_and\_Vector\_Object\_Count: 1989  
SDTS\_Terms\_Description:  
SDTS\_Point\_and\_Vector\_Object\_Type: GT-polygon composed of chains  
Point\_and\_Vector\_Object\_Count: 1989  
SDTS\_Terms\_Description:  
SDTS\_Point\_and\_Vector\_Object\_Type: Point  
Point\_and\_Vector\_Object\_Count: 45  
Entity\_and\_Attribute\_Information:  
Detailed\_Description:  
Entity\_Type:  
Entity\_Type\_Label: skygeology.aat  
Attribute:  
Attribute\_Label: FID  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are  
automatically generated.  
Attribute:  
Attribute\_Label: Shape  
Attribute\_Definition: Feature geometry.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Coordinates defining the features.  
Attribute:  
Attribute\_Label: FNODE#  
Attribute\_Definition: Internal node number for the beginning of an arc  
(from-node).

Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: TNODE#  
Attribute\_Definition: Internal node number for the end of an arc (to-  
node).

Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: LPOLY#  
Attribute\_Definition: Internal node number for the left polygon.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: RPOLY#  
Attribute\_Definition: Internal node number for the right polygon.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: LENGTH  
Attribute\_Definition: Length of feature in internal units.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Positive real numbers that are automatically  
generated.

Attribute:  
Attribute\_Label: SKYGEOLOGY#  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are  
automatically generated.

Attribute:  
Attribute\_Label: SKYGEOLOGY-ID  
Attribute\_Definition: User-defined feature number.  
Attribute\_Definition\_Source: ESRI

Attribute:  
Attribute\_Label: LTYPE  
Attribute\_Definition: Geologic contact description  
Attribute\_Definition\_Source: Author  
Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: contact, certain

Enumerated\_Domain\_Value\_Definition: Boundary between geologic units established in reconnaissance mapping by authors or compiled from other workers

Enumerated\_Domain:  
Enumerated\_Domain\_Value: contact, concealed

Enumerated\_Domain\_Value\_Definition: Boundary between geologic units that is concealed by a younger units

Enumerated\_Domain:  
Enumerated\_Domain\_Value: contact, gradational

Enumerated\_Domain\_Value\_Definition: Boundary between geologic units that is indefinite or gradational

Enumerated\_Domain:  
Enumerated\_Domain\_Value: normal fault, certain

Enumerated\_Domain\_Value\_Definition: Trace of fault established in reconnaissance mapping by authors or compiled from other workers

Enumerated\_Domain:  
Enumerated\_Domain\_Value: normal fault, inferred

Enumerated\_Domain\_Value\_Definition Uncertain location of fault; positional accuracy uncertain but general location inferred from indirect evidence

Enumerated\_Domain:  
Enumerated\_Domain\_Value: normal fault, concealed

Enumerated\_Domain\_Value\_Definition: Trace of fault concealed by younger unit; positional accuracy uncertain

Enumerated\_Domain\_Value: thrust fault, inferred

Enumerated\_Domain\_Value\_Definition Uncertain location of fault; positional accuracy uncertain but general location inferred from indirect evidence

Enumerated\_Domain\_Value: fault, probable

Enumerated\_Domain\_Value\_Definition: probable location of buried fault based on gravity anomaly

Enumerated\_Domain:  
Enumerated\_Domain\_Value: map boundary

Enumerated\_Domain\_Value\_Definition: map boundary of this 1:100,000 study

Enumerated\_Domain:  
Enumerated\_Domain\_Value: glacier boundary

Enumerated\_Domain\_Value\_Definition: Boundary of glacier derived from Skykomish River 1:100,000 scale topographic map

Enumerated\_Domain:  
Enumerated\_Domain\_Value: water boundary

Enumerated\_Domain\_Value\_Definition: Boundary of open water derived from Skykomish River 1:100,000 scale topographic map

Enumerated\_Domain\_Value: arrow, certain

Enumerated\_Domain\_Value\_Definition: landslide arrow showing direction of landslide. Includes broken arrows in incipient blockslide areas

Enumerated\_Domain\_Value: incipient slide boundary

Enumerated\_Domain\_Value\_Definition: boundary of incipient blockslide of large unrotated mass of bedrock extensively crevassed by slight movement

toward free faces (labeled Qib on published map and with broken arrow in downslope direction).

Detailed\_Description:

Entity\_Type:

Entity\_Type\_Label: skygeology.pat

Attribute:

Attribute\_Label: FID

Attribute\_Definition: Internal feature number.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute\_Label: Shape

Attribute\_Definition: Feature geometry.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Coordinates defining the features.

Attribute:

Attribute\_Label: AREA

Attribute\_Definition: Area of feature in internal units squared.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute\_Label: PERIMETER

Attribute\_Definition: Perimeter of feature in internal units.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute\_Label: SKYGEOLOGY#

Attribute\_Definition: Internal feature number.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute\_Label: SKYGEOLOGY-ID

Attribute\_Definition: User-defined feature number.

Attribute\_Definition\_Source: ESRI

Attribute:

Attribute\_Label: PTYPE

Attribute\_Definition: symbol of geologic unit

Attribute\_Definition\_Source: Author

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: m

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Man-modified land (Holocene)-Gravel or diamicton as fill, or extensively graded areas

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ql

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Landslide deposits (Holocene and Pleistocene): Landslide-Diamicton of angular clasts of bedrock and surficial deposits derived from upslope. Many shown with no letter symbol; arrows denote downslope direction of movement. Includes areas of irregular, hummocky topography; apparently underlain by locally derived rock fragments (shown by map unit symbol Ql?)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qra

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Landslide deposits (Holocene and Pleistocene): Rock-avalanche deposits-Huge angular boulders on or at base of steep slope

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qmw

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Mass-wastage deposits (Holocene and Pleistocene)-Colluvium or landslide debris with indistinct morphology, mapped where sufficiently continuous and thick to obscure underlying material. Unit is gradational with units Qa and Ql

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qt

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Talus deposits (Holocene and Pleistocene)-Angular-gravel diamicton. At lower altitudes, gradational with unit Qa. At higher altitudes, includes deposits of some Holocene moraines, rock glaciers, and protalus ramparts, small rock avalanches. Generally not vegetated

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qa

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Alluvium (Holocene and Pleistocene)-Moderately sorted pebble-to-cobble gravel along rivers to poorly sorted gravelly sand on small-tributary fans; some fan material similar to that included in unit Qt

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qb

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: Bog deposits (Holocene and Pleistocene)-Peat and alluvium. Poorly drained and at least intermittently wet annually. Grades into unit Qa

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qgp

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO ALPINE GLACIERS: Glacial and protalus deposits (Holocene and Pleistocene)-Material similar to unit Qt but having distinct morainal form that indicates deposition at terminus of small glacier or permanent snowfield

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qag

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO ALPINE GLACIERS: Alpine-glacier deposits (Pleistocene)-Ranges from till upvalley and in uplands to gravelly outwash on broad valley floors; includes areas mostly veneered with drift but having small areas of protruding bedrock or overlying small fans, colluvium, or other discontinuous deposits. Grades into unit Qgp in headward reaches of alpine valleys

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qvr

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO CORDILLERAN ICE SHEET: Deposits of Vashon stade of Fraser glaciation of Armstrong and others (1965) of Cordilleran ice sheet (Pleistocene): Recessional outwash deposits-Stratified sand and gravel, moderately to well sorted, and well-bedded silty sand to silty clay, deposited in proglacial and ice-marginal environments. Largely plane-bedded outwash and foreset deltaic deposits in lowlands, but includes fine-grained deposits of ice-dammed lakes in major west-draining alpine valleys and at low altitudes along Snoqualmie and Skykomish River valleys. Includes parts of ice-marginal embankments, kame terraces, and glaciolacustrine deltaic deposits

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qvgl

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO CORDILLERAN ICE SHEET: Deposits of Vashon stade of Fraser glaciation of Armstrong and others (1965) of Cordilleran ice sheet (Pleistocene): Glaciolacustrine deposits-Bedded silt and clay containing sand lenses and sparse dropstones; present in mountain valleys. Distinguished on map from other Vashon-age deposits (mainly unit Qvr) only where continuous and thick

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qvt

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO CORDILLERAN ICE SHEET: Deposits of Vashon stade of Fraser glaciation of Armstrong and others (1965) of Cordilleran ice sheet (Pleistocene): Till-Mainly compact diamicton with subangular to rounded clasts, glacially transported and deposited. Includes minor stratified fluvial sand and gravel. Contact with unit Qvr is gradational and is approximately located in ice-marginal areas or where covered by thin layer of recessional outwash

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qva

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: DEPOSITS RELATED TO CORDILLERAN ICE SHEET: Deposits of Vashon stade of Fraser glaciation of Armstrong and others (1965) of Cordilleran ice sheet (Pleistocene): Advance outwash deposits-Well-bedded gravelly sand to fine-grained sand, generally unoxidized, deposited in proglacial streams

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qpf

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: OTHER DEPOSITS: Glacial and nonglacial deposits of pre-Fraser glaciation age (Pleistocene)- Compact gray clay and deeply weathered stratified sand and gravel

or clay-rich diamicton. Clay is in contact with or grades into fine sand assigned to unit Qva. Other deposits mapped herein as pre-Fraser deposits show evidence of strong in-situ weathering throughout depth of exposure, including oxidation of matrix and deeply weathered clasts. May include some early Fraser-age lacustrine sediments

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qbf

Enumerated\_Domain\_Value\_Definition: SURFICIAL DEPOSITS: OTHER DEPOSITS: Basalt flows and cones (Pleistocene)-Olivine basalt either as massive, poorly vesicular rocks or as massive to stratified scoriaceous bombs and lapilli. Rocks are solidified lava flows, generally on valley floors and having low-relief, near-level surfaces. Weakly agglutinated scoria forms partly degraded cones on sides and floors of valleys excavated in bedrock

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tcd

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Cady Ridge (Pliocene and Miocene): Dacite dikes-Numerous dacite dikes from 1 to 5 m thick intruding altered gneiss. Dikes are composed mostly of gray porphyritic biotite-hornblende-hypersthene dacite and locally, resorbed quartz phenocrysts. Considerable pyrite in dikes and in country rock

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tcp

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Cady Ridge (Pliocene and Miocene): Dacite plugs-Small plugs composed of hornblende-hypersthene dacite similar to that forming dacite dikes. Well-developed columnar jointing common

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tcb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Cady Ridge (Pliocene and Miocene): Breccia and flows-Porphyritic hornblende-hypersthene andesite and (or) dacite in flows and breccias. Rocks commonly highly altered to smectite

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tivb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Intrusive volcanic breccia (Miocene)-Unit as mapped includes Conglomerate Point Breccia of Yeats (1958b), which consists of rhyolitic to basaltic breccia containing clasts of granitoid rocks near its margins. Clasts of angular to subangular, greenish-gray altered pyroxene andesite porphyry, altered basalt porphyry, and flow-banded rhyolite are set in dacite tuff matrix containing angular quartz fragments and plagioclase. Matrix and clasts considerably altered to chlorite, calcite, and epidote. Breccia in Silver Creek valley contains rounded clasts of heterogeneous volcanic rocks and rare clasts of sulfide ore in fine-grained to aphanitic matrix. Locally, breccia is monolithologic, composed of tonalite clasts and matrix and grades into shattered tonalite wallrock

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tts

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Tonalite of Silver Creek (Miocene)-Biotite-hornblende and hornblende-biotite tonalite forming small stocks, plugs, and dikes. Texture is hypidiomorphic to porphyritic granular. Mafic minerals are considerably altered to chlorite and epidote. Small bodies in Silver Creek valley not shown on map

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tib

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Intrusive breccia (Miocene)-Sericitized and silicified fragments of hornfels in matrix of calcite and sulfides (Ream, 1972, p. 10). Breccia has poorly defined subhorizontal bedding and grades abruptly into country-rock hornfels

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tte

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Eagle Tuff of Yeats (1977) (Miocene)-Brown to gray-brown rhyolitic to dacitic tuff, ash-flow tuff, and breccia. Conspicuous quartz phenocrysts are set in clastic matrix of plagioclase and silicic volcanic rock; some glassy shards. Abundant fragments of pre-Tertiary country rock present in unit. Poor sorting. Bedding inconspicuously shown by flattened pumice clasts and local thin layers of tuff

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tbk

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Breccia of Kyes Peak (Miocene)-Mostly andesite and dacite breccia beds with abundant clasts of schist, gneiss, and granitoid rocks. Rare two-pyroxene andesite, dacite, and rhyolite flows. Monolithologic breccias consist predominantly of fine-grained mica schist or granodiorite clasts. Clasts as long as 200 m. Breccia beds range from a few centimeters to more than 50 m in thickness. Thin volcanic to volcanic-lithic-subquartzose-sandstone beds locally near base. Heath (1971, p. 124-125) described probable primary garnets in rhyodacite and dacite flows. Alteration minerals are chlorite, sericite, and epidote. Some rocks, especially those east of Glacier Creek, are thermally metamorphosed and enriched in magnetite, actinolite, and albite(?)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tst

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Tonalite and granodiorite (Miocene and Oligocene)-Biotite-hornblende tonalite and granodiorite, medium-grained, mostly equigranular, with hypidiomorphic texture; locally contains clinopyroxene. Mostly light-colored (CI 9-24), coarsely jointed rock. Description adapted from Erikson (1969, p. 2218-2219)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tsg

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Granodiorite and granite (Miocene and Oligocene)-Medium-grained, hypidio-morphic-granular to porphyritic granophyric granodiorite and granite (Erikson 1969, p. 2221). Most contain biotite; CI 1-5, rarely to 10

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tsh

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Granite of Mount Hinman (Miocene and Oligocene)-Hornblende-biotite and two-pyroxene granite; CI 6-15. Generally medium grained, hypidiomorphic granular, but commonly has mesostasic quartz or micrographic texture between larger grains. Rocks commonly altered, containing chlorite and epidote. Description modified from Erikson (1969, p. 2222)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tsb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Breccia (Miocene and Oligocene)-Fine- to medium-grained mafic biotite and horn-blende-biotite tonalite containing numerous mafic inclusions

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tsm

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Mafic diorite and gabbro (Miocene and Oligocene)-Biotite-hornblende diorite and gabbro; includes some mafic pyroxene-bearing tonalite and quartz diorite. CI 20-40 (Erikson, 1969, p. 2217)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tgg

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Grotto batholith: Biotite-hornblende granodiorite and granite (Miocene and Oligocene)-Medium-grained hypidiomorphic-granular granodiorite and granite with subhedral to euhedral, oscillatory zoned plagioclase in matrix of optically continuous quartz or anhedral quartz and perthite; some granophyric textures. CI 10-20. Relic pyroxene in uralitic pale-green hornblende. Many rocks extensively altered to chlorite, epidote, and sphene; some crosscutting fractures filled with alteration minerals. Fine-grained mafic inclusions common. Includes some areas underlain by rocks similar to the granite of San Juan Creek. North end of pluton and smaller stocks in Monte Cristo area are more mafic and mostly granodiorite and tonalite

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tgs

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Grotto batholith: Granite of San Juan Creek (Miocene and Oligocene)-Mostly biotite granite to granophyric porphyry, CI about 5; graphic intergrowths of potassium feldspar and quartz are common

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tggb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Grotto batholith: Gabbro, quartz gabbro, and pyroxene porphyry (Miocene and Oligocene)-Fine-grained to porphyritic pyroxene-hornblende gabbro, quartz gabbro, and porphyry. Normally zoned labradorite-oligoclase crystals with euhedral oscillations set in sparse matrix of granophyric potassium feldspar and quartz or uralitic hornblende. For detailed descriptions and modes see Yeats (1958a, p. 190-192)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tgb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Grotto batholith: Contact breccia (Miocene and Oligocene)-Heterogeneous, fine- and medium-grained, locally porphyritic tonalite contact breccia containing numerous dark inclusions of hornfels; includes metavolcanic rocks and metachert. Tonalite has clinopyroxene and micrographic intergrowths of quartz and sodic plagioclase. Similar rocks on Crosby Mountain lack inclusions and form anastomosing dikelets (unmapped) in country rocks

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tdd

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Dacite, andesite, and rhyolite-Clinopyroxene and hypersthene-clinopyroxene dacite, andesite, and rhyolite in flows, breccia, tuff, dikes, and sills. Rocks commonly highly altered to smectites and (or) calcite on the south and epidote, chlorite, and locally prehnite on the north. Bedding obscure; welded tuff locally shows flattening, and tuff is locally interbedded with volcanic sandstone and siltstone. For further descriptions, see McDougall (1980, p. 54-55) and Simonson (1981)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tdia

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Intrusive andesite-Porphyritic pyroxene andesite containing large plagioclase phenocrysts and glomerocrysts in felty to intersertal matrix. Augite is common, and hypersthene (or pseudomorphs of smectites after hypersthene) is rare

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tdb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Sandstone breccia-Monolithologic breccia composed of angular sandstone clasts as much as 10 m across, derived from the Swauk Formation (Gualtieri and others, 1973). Rare volcanic clasts. East of Spade Lake, breccia is locally highly sheared and altered. Simonson (1981, p. 40-41) and Ellis (1959, p. 66-67) describe basal sandstone breccia with lapilli tuff matrix

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tv

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Volcanic rocks (Oligocene)-On Garfield Mountain. Mostly dacite and minor andesite and rhyolite in breccia, tuffs, ash-flow tuffs, and rare flows. Most are highly recrystallized by thermal metamorphism; many are hornblende-biotite hornfels

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tm

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Metaporphry of Troublesome Mountain (Oligocene)-Dark, recrystallized clinopyroxene-plagioclase porphyry; abundant poikiloblastic phenocrysts set in a crystalloblastic matrix of plagioclase, quartz, biotite, hornblende, and opaque minerals. Pyroxene partially or completely replaced by green hornblende. Plagioclase has relict euhedral oscillatory zoning

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tig

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Index batholith: Granodiorite and tonalite (Oligocene)-Mostly biotite-hornblende and hornblende-biotite granodiorite and tonalite but locally ranges from quartz diorite and quartz monzonite to rare granite; CI 2-30. Medium-grained hypidiomorphic-granular texture; granofelsic, mostly anhedral quartz is interstitial to subhedral and euhedrally oscillatory zoned from labradorite or andesine to oligoclase (see Yeats, 1958a, p. 202-203; Griffis, 1977, p. 85). Pyroxene is rare and mostly present as tiny rounded inclusions in plagioclase. On North Fork of Tolt River, unit includes granodiorite with clinopyroxene, uralitic hornblende, and some micrographic texture. Stock on Youngs Creek has uralitic hornblende and relict clinopyroxene.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tigg

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Index batholith: Granodiorite of the Goblin Creek stock (Oligocene)-Mostly dark-colored, medium-grained pyroxene-biotite-hornblende granodiorite and granite; CI 13-35. Pyroxene mostly uralitized; quartz commonly forms optically continuous mesostasis between plagioclase crystals. Some granophyric texture. Cut by chloritic shears; highly altered to chlorite, epidote, calcite, and prehnite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tigs

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Index batholith: Granodiorite and granite of the Sunday Creek stock (Oligocene)-Granodiorite and granite similar to unit Tig but highly altered to sericite, epidote, and chlorite. Bethel (1951, p. 147) reported some micrographic and local granoblastic textures. Locally cataclastic. Contact breccias along margin are rich in clasts of unit Tpa.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tus

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Unnamed sandstone (Oligocene)-Sandy pebble conglomerate to very fine grained sandstone, moderately to deeply weathered. Coarser beds contain high percentage of quartzose pebbles; finer beds contain considerable mica and lignite. Deeply weathered exposures usually distinguished from old glacial outwash materials by manganese staining on joint planes, quartzose or pebble lithology, and presence of organic matter.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tnv

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Naches Formation (Oligocene? and late Eocene): Volcanic rocks and minor sandstone-Well-bedded basaltic to andesitic flows, tuff, and breccia interbedded with feldspathic subquartzose sandstone and siltstone. Flows and breccia are somewhat nondescript porphyritic to aphyric, dark-green to black rocks, weathering to brown. In part amygdaloidal, with columns or with brecciated and vesicular tops. Interbedded sedimentary rocks are white, coarse-grained feldspathic sandstone, exhibiting crossbeds and graded bedding and black argillite and

laminated siltstone. Both volcanic and sedimentary rocks are thermally metamorphosed.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tnr

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Naches Formation (Oligocene? and late Eocene): Rhyolite-White to gray, flow-banded rhyolite containing flattened pumice fragments; well recrystallized by thermal metamorphism.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tpa

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Persis (late Eocene): Andesite flows, tuffs, and breccia, containing minor dacite and basalt, and minor volcanoclastic sandstone, conglomerate, and siltstone-Massive, dark-green to black, plagioclase-porphyrific two-pyroxene andesite and andesitic breccia and tuff. Phenocrysts and glomerocrysts of plagioclase, clinopyroxene, hypersthene, mostly greatly altered in an intersertal to holocrystalline groundmass of mainly clinopyroxene, plagioclase, and opaque minerals. Black basalt is aphyric to microporphyrific, commonly trachytoid, and locally with altered olivine. Upper part of unit includes rare interbedded, dark-gray to brownish volcanic sandstone and siltstone. Danner (1957, p. 471-472) reports andesite conglomerate interbeds in Youngs Creek. Generally poorly indurated volcanic sandstone contains angular to rounded clasts of volcanic rocks, altered glass, and plagioclase crystals; also contains clasts of chert, sandstone, and siltstone. Variably altered to smectites, epidote, and calcite. Locally hornfelsic near Tertiary plutons, most extensively south of Youngs Creek stock. Near Calligan Lake, unit includes andesite and dacite porphyry dike swarm.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tphb

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Persis (late Eocene): Hornblende dacite breccia-Light-green hornblende dacite breccia composed mainly of andesitic clasts, euhedral plagioclase (in part altered to epidote), tan to olive-green hornblende, clinopyroxene altered to smectites, resorbed quartz, and opaque mineral grains in altered partially devitrified glassy matrix

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tpp

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Persis (late Eocene): Pyroxene andesite-Pyroxene andesite porphyry containing phenocrysts of plagioclase, clinopyroxene, and rare brown hornblende (mostly altered to chlorite) and mixed clots of plagioclase and clinopyroxene in highly altered, groundmass of microlites of plagioclase and opaque minerals

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tbv

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Barlow Pass Volcanics of Vance (1957b) (late and middle Eocene): Volcanic rocks-Basalt, rhyolite, and andesite flows, breccia, and tuff interbedded with minor bedded tuffaceous to feldspathic sandstone and argillite. Andesite and basalt

generally dark-green to gray, massive, and dense. Light-green to white rhyolite. Rocks are mostly highly altered to a dense mat of chlorite, epidote, calcite, and sericite; porphyritic and trachytoid textures are relict. Most bedding in volcanic members is obscure. Many rocks recrystallized by thermal metamorphism near Tertiary plutons, reaching pyroxene-hornfels facies adjacent to unfaulted contacts with plutons. Further descriptions in Heath (1971, p. 116-118) and, for the Barlow Pass unit north of mapped area, in Vance (1957a, p. 275-286).

South of Skykomish, rocks that we mapped as Barlow Pass(?) Volcanics are mostly heterogeneous, light-tan to dark-gray-green, rhyolitic to andesitic breccia and feldspar porphyry. Rocks identified as andesite in the field generally contain at least trace amounts of quartz in thin section. Crystal-rich andesite and dacite breccia contains andesite, dacite, and rhyolite clasts, sandstone, metasedimentary rocks, chert, siltstone, quartz, foliated polycrystalline quartz, potassium feldspar, and plagioclase. Crystal-rich greenish rhyodacite breccia has platy cleavage. Amygdaloidal andesite(?) and andesite(?) porphyry, in part having crude columns, are also present. Plagioclase is commonly altered to calcite and chlorite. Pyrite is locally present. Further details given by Yeats (1958a, p. 152-161). Includes probable intrusive rhyolite porphyry on Money Creek. Many volcanic rocks in the Barlow Pass(?) Volcanics are partly to strongly recrystallized by nearby Tertiary plutons

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tbs

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Barlow Pass Volcanics of Vance (1957b) (late and middle Eocene): Sandstone-Fluviatile, light-colored, fine- to medium-grained feldspathic subquartzose sandstone and conglomerate with interbeds of siltstone and shale. Bedding is thick to very thick but obscure near Tertiary plutons except where revealed by pebble trains and changes in grain size. Along Silver and lower Trout Creeks, framework grains are composed of subequal amounts of quartz, plagioclase, and chert. Near Crosby Mountain, our unit Tbs(?) includes plane bedded to crossbedded quartz-rich sandstone and quartz-pebble to cobble conglomerate.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tt

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Puget Group (Eocene): Tukwila Formation (late and middle Eocene)-Andesitic flows, breccia, conglomerate, and sandstone with subordinate intercalated feldspathic sandstone and impure coal beds. Tuff and breccia contain clasts of porphyritic andesite and dacite and polymictic volcanic conglomerate predominate, but flow rocks (in part sills or dikes?) form resistant layers. As mapped, includes some sandstone belonging to Tiger Mountain Formation.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ttm

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Puget Group (Eocene): Tiger Mountain Formation (middle and early Eocene)-Light-colored, medium-grained, micaceous feldspathic subquartzose sandstone interbedded with siltstone, minor pebble conglomerate, and coal beds

Enumerated\_Domain:

Enumerated\_Domain\_Value: Trr

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Raging River Formation (middle Eocene)-Marine sandstone, siltstone, shale, and minor conglomerate. Sandstone pre-dominantly volcanic subquartzose. Described in detail by Vine (1969, p. 13-16).

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tfm

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Fuller Mountain plug (early Eocene)-Gray, highly jointed, hornblende-biotite-clinopyroxene granodiorite. Clinopyroxene rimmed with hornblende; intergranular quartz and potassium feldspar graphically intergrown(?).

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tss

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Swauk Formation (early Eocene): Sandstone and conglomerate-Predominantly feldspathic subquartzose sandstone and conglomerate, fluviatile, light-colored, medium-grained, and minor interbeds of siltstone and shale. Bedding thin to very thick. Compositions reported by McDougall (1980, p. 39-45) for Swauk on southern Tonga Ridge

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tssp

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Swauk Formation (early Eocene): Silver Pass Volcanic Member-As mapped on Summit Chief and in upper Waptus River area [28] includes mostly sandstone with interbeds of dacitic breccia and thin-bedded silicic tuff and ash-flow tuff.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tssc

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Swauk Formation (early Eocene): Sandstone and conglomerate-Similar to unit Tss, but conglomerate is more conspicuous and rich in granitic clasts. Upper contact shown as mapped by McDougall (1980).

Enumerated\_Domain:

Enumerated\_Domain\_Value: gb

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Gabbro (age uncertain)-On Money Creek, hypersthene-clinopyroxene gabbro, medium-grained, subophitic to locally uralitic. Commonly layered containing well-aligned calcic plagioclase. On Palmer Mountain, medium-grained uralitic gabbro and quartz gabbro composed of tightly packed calcic plagioclase with uralite patches and uralite pseudomorphous after subophitic pyroxene(?). On Middle Fork of Snoqualmie River, heterogeneous, uralitized pyroxene gabbro to mafic biotite-hornblende tonalite; strongly thermally metamorphosed.

Enumerated\_Domain:

Enumerated\_Domain\_Value: bm

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Bald Mountain pluton (age uncertain)-Medium- to coarse-grained, hypidiomorphic biotite granodiorite and granite, in part gneissic near the margins. Accessory cordierite, mostly altered to pinite, and rare garnet. Locally cataclastic.

Clinopyroxene rimmed with hornblende; intergranular quartz and potassium feldspar graphically intergrown.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwa

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Argillite and graywacke-Pervasively sheared, scaly matrix of mostly argillite containing steep-sided, outcrop- to mountain-sized phacoids of purplish, reddish, gray, and black, fine- to coarse-grained and pebbly, lithofeldspathic, volcanolithic, and subquartzose sandstone interbedded with black argillite. Sandstone has clasts mostly of plagioclase, chert, volcanic rocks, and quartz. Also abundant are grains of sandstone, siltstone, phyllite, biotite, muscovite, and epidote. Where more strongly deformed, unstable grains are broken down into anastomosing shear zones or smeared out into indistinct chloritic matrix. Alteration minerals are calcite, chlorite, sericite, limonite, epidote, and prehnite. Near Tertiary plutons the rocks have become hornfelsic, commonly with conspicuous biotite. Sedimentary features such as graded bedding and load casts are locally well preserved. Unit includes minor chert, polymictic and quartz-pebble conglomerate, and shale-chip breccia; also very minor chert, limestone, metavolcanic rocks, metagabbro, and metatonalite. Locally cut by greenstone (metadiabase) dikes.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwk

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Potassium-feldspar-bearing sandstone-Lithologically similar to sandstone of unit TKwa but having 2-20 percent potassium-feldspar clasts and commonly more plagioclase, muscovite, and biotite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwv

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metavolcanic rocks-Greenstone and metadiabase, with minor metagabbro, argillite, and sandstone. Greenstone and metadiabase contain relict plagioclase and clinopyroxene locally having intersertal to diabasic textures. Amygdaloidal texture and pillow structures locally preserved. Boudins of metamorphosed quartz-porphyry dikes(?) in faintly foliate greenstone breccia on Little Si. Outcrops north of Sultan River are cut by numerous faults, of various orientations, that outline streamlined blocks of metavolcanic, metaplutonic, and sedimentary rocks

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwg

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metagabbro, minor gneissic amphibolite, and rare gabbro flaser gneiss-Massive to foliated, fine- to medium-grained metagabbro. Many outcrops sheared on all scales. In massive rocks, euhedral, mottled, locally crushed plagioclase, intergranular to euhedral uranitized clinopyroxene, and opaque minerals are common. Mafic metagabbro on Woods Creek bears relicts of hypersthene and clinopyroxene. Sheared rocks range

from flaser gabbro with plagioclase cataclasts in schistose, chloritic matrix to well-recrystallized greenstone, greenschist, or amphibolite, locally banded. Most metamorphic minerals are uralite, chlorite, epidote, sphene, carbonate, prehnite, and pumpellyite in metagabbro and metadiabase. Unit includes minor hornblende metatonalite, metaquartz diorite, and minor feldspathic hornblendite

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwd

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metadiabase-Metadiabase composed of plagioclase, uralite, chlorite, epidote, and opaque minerals; secondary blebs or veinlets of quartz. Rare relict clinopyroxene. Relict intergranular to diabasic texture. Most rocks highly thermally metamorphosed and similar to those of unit TKed. North of Money Creek, unit includes many hornfelsic Tertiary dikes and some volcanic breccia containing clasts of metadiabase in hornfelsic tuffaceous matrix

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwt

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metatonalite-Fine- to coarse-grained porphyroclastic metatonalite, locally sheared into light-colored cataclastic chlorite gneiss. Predominantly composed of plagioclase and quartz (in part secondary) with actinolitic hornblende, epidote, and chlorite. Occurs mostly as small bodies generally associated with metagabbro.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwc

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Chert-Maroon, reddish, and white chert and metachert, in part with shaley interbeds. Undeformed to contorted bedding. Occurs as streamlined pods with scaly margins

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwm

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Marble-Black to bluish-gray marble and, in part, interbedded chert and shale occurring as steeply dipping pods and lenticular beds. Thin, green tuffaceous chert beds crop out in marble at Haystack quarry on Proctor Creek.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKws

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Slate, phyllite, and semischist-Rocks similar in composition to those of unit TKwa, but with well-developed schistosity commonly parallel to bedding. New metamorphic minerals in semischist include sericite, chlorite, albite, calcite, sodic plagioclase, and opaque minerals; hornfels near contacts with Tertiary plutons. Contact with unit Tkev is based on more abundant metavolcanic rocks, chert, and ultramafic rocks in unit Tkev

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwp

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Phyllitic greenstone-Mostly metabasalt and mafic tuff. Includes volcanic-clast-rich, foliated sandstone

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwu

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks-Serpentinized peridotite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKeV

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Mafic metavolcanicrocks, chert, argillite, and gray-wacke-Greenstone, greenschist (metabasalt and meta-andesite), metagraywacke, chert-rich metagrit, and metaconglomerate, mostly massive and rarely bedded. Original sedimentary and volcanic textures largely obscured by penetrative deformation, low-grade regional metamorphism, and static thermal metamorphism. Contact metamorphism by Tertiary plutons has destroyed original textures and structures as well as earlier formed greenschist-facies minerals; many rocks are now pyroxene hornfels.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKec

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Chert and metachert-Intensely folded, white to cream or gray, ribbon chert and medium- to fine-grained banded quartzite (metachert); alternating with thin to thick, dark-brown to black layers of calcareous argillite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKeg

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Migmatitic gneiss-Fine-grained schistose amphibolite to medium- and coarse-grained massive quartz diorite with layered hornblende gneiss, gneissose quartz diorite, trondhjemitic, and replacement breccia and minor serpentized ultramafite. Amphibolite is crystalloblastic with xenoblastic unzoned and untwinned andesine, brown to brownish-green xenoblastic hornblende, and accessory sphene, apatite, magnetite, ilmenite, and zircon. Rocks grade through hornblende gneiss to gneissose quartz diorite; commonly mafic and less mafic rocks in irregular, intimately mixed layers. All exposures cut by anastomosing shear zones; rocks cataclastically deformed prior to late static recrystallization. Description modified from Yeats (1958a, p. 83-99; 1964, p. 552-555)

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKed

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Metadiabase-Altered and thermally metamorphosed, fine-grained ophitic to subophitic metadiabase and metagabbro. Euhedral plagioclase and mostly uralitized subhedral clinopyroxene,

rare hypersthene (Plummer, 1964, p. 53). Newly grown reddish biotite and mesostasis of quartz present adjacent to Tertiary plutons.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKet

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Metatonalite-Altered medium-grained metatonalite. Subhedral plagioclase, mostly anhedral and intergranular mosaics of quartz and small amounts of altered green hornblende and perthitic potassium feldspar. Locally cataclastic.

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKem

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Marble-Lenticular beds and pods of banded, white to grayish, medium- to fine-grained crystalline marble intercalated with metachert and greenstone; in part, shaly laminations or graphitic impurities mark bedding planes. Silicified replacement masses (Danner, 1966, p. 374; Yeats, 1958a, p. 103).

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKeu

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks-Highly altered pods of pyroxenite, peridotite, and serpentinized dunite are tectonically intercalated with argillite and ribbon chert near Merchant Peak. See Yeats (1958a, p. 116-119) for further discussion of that area. Schistose ultramafite east of Weden Creek consists of forsterite in mesh of antigorite. Olivine is locally converted to phlogopite near Tertiary plutons. In Sultan Basin area Dungan (1974, p. 40-41) describes peridotite hornfels on Red Mountain with assemblage of forsterite-talc-tremolite-chlorite within 2.5 km of contact with Index batholith. North of quadrangle, ultramafic rocks on strike with this layer are serpentinized cumulus peridotite with relict olivine and orthopyroxene associated locally with layered gabbro (Dungan, 1974, p. 48-62).

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ked

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Easton terrane: Easton Metamorphic Suite (Early Cretaceous): Darrington Phyllite (west of Straight Creek Fault)-Black sericite-quartz phyllite with abundant quartz segregation veinlets and lenses. Abundant graphite and albitic plagioclase; accessory minerals include chlorite, iron oxide, apatite, tourmaline, and sphene. Mostly thermally metamorphosed to biotite phyllite and locally pyroxene hornfels close to Tertiary intrusive rocks. Description taken from Heath (1971, p. 81-87)

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ksw

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Tonalite and granodiorite of the western pluton-Predominantly medium-grained, hypidiomorphic-granular hornblende-biotite tonalite and subordinate granodiorite. CI 4-15, based on normative mineral data from Erikson (1977b and written commun., 1978). Hornblende locally

uralitic around clinopyroxene relicts; potassium feldspar crystallized late and replaces plagioclase with some myrmekite developed. Massive to gneissic near margins.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kswh

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Tonalite and granodiorite of the western pluton: Tonalite of Harding Mountain-Fine- to medium-grained biotite-hornblende tonalite, commonly with crystalloblastic patches of actinolitic hornblende and biotite; CI 12-18. Hypidiomorphic-granular, rich in matrix quartz. Local cumulate layering of hornblende and plagioclase. Outcrops tend to be highly jointed and disintegrate into 10- to 20-cm blocks in extensive talus.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kse

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Tonalite and granodiorite of the eastern pluton-Predominantly medium-grained, hypidiomorphic-granular hornblende-biotite tonalite and subordinate granodiorite. Similar to unit Ksw, although parts of the eastern pluton are somewhat more mafic than western pluton. CI 3-30, based on normative minerals and modal analyses by Erikson (1977b and written commun., 1978).

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ksb

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Granodiorite of the Beckler Peak stocks-Biotite granodiorite, hypidiomorphic granular to xenomorphic with microcline microperthite. Mostly CI 5-9, but Yeats (1958a, p. 75) reports some rocks with as much as 18 percent mafic minerals. Stocks are commonly highly sheared and cataclastic.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ksm

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Metagabbro and metadiorite-Medium-grained biotite-hornblende metagabbro and metadiorite; minor metatonalite characterized by uralitic hornblende and actinolitic hornblende mats between subhedral to euhedral, well-aligned plagioclase prisms. Some rocks exhibit mosaic of granoblastic plagioclase between clots of mafic minerals

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ksc

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Tonalite gneiss of the Sloan Creek plutons (Late Cretaceous)-Biotite-hornblende tonalite gneiss, flaser gneiss, and local gneissic tonalite; medium-grained, homogeneous, crystalloblastic gneissose to strongly flaseroid; locally strongly mylonitic. Plagioclase normally zoned, or unzoned and strongly stress-twinned but has relict patchy zoning and faint oscillatory zoning and synneusis twins (Heath, 1971, p. 62). Retrogressive alteration is pronounced but somewhat sporadic;

epidote minerals and sericite commonly fill plagioclase cores; mafic minerals are altered to chlorite, sphene, and prehnite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kt

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Tonalite gneiss and tonalite of the Tenpeak Mountain pluton (Late Cretaceous)-Hornblende-biotite and biotite-hornblende tonalite gneiss and tonalite, medium-grained, hypidiomorphic to crystalloblastic with interstitial quartz, broken and healed sodic andesine with relict euhedral oscillatory zoning and rare synneusis twins. Hornblende commonly euhedral. Euhedral epidote and clinozoisite locally have pseudomymekitic intergrowths of quartz. Common sphene, allenite; rare garnet. CI 20-40. Plagioclase porphyroclasts filled with euhedral epidote minerals and some muscovite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ktp

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Tonga Formation of Yeats (1958b) (Late Cretaceous): Phyllite, semischist, schist, and biotite-hornblende gneiss and amphibolite-South of Tye River, mostly graphitic chlorite-sericite-quartz phyllite and high-rank semischist. To the north, mostly fine-grained graphitic garnet-staurolite-biotite schist, fine-grained biotite-hornblende gneiss, and local metaconglomerate and metaporphry (fine-grained two-mica gneiss). In many outcrops from Jack Pass south, relict bedding and other sedimentary structures in metapelite and metasandstone are prominent despite well-developed penetrative foliation. Northward and northeastward from Jack Pass, schistose texture and recrystallization increase until recrystallization has produced fine-grained staurolite-garnet-mica schist, and sandstone is recrystallized to fine-grained hornblende-biotite schist and gneiss, locally with randomly oriented or sheaflike poikiloblastic amphibole blades (garbenschiefer); cummingtonite is locally intergrown with hornblende. Staurolite and garnet are usually porphyroblastic; biotite is porphyroblastic to strongly aligned. Many of the higher grade rocks show some degree of retrogression: garnet altered to chlorite, staurolite to sericite. Grade and coarseness of recrystallization increase markedly adjacent to gneissic granodiorite of the Beckler Peak stocks, but hornfelsic textures are not developed. Rocks are recrystallized to pyroxene hornfels near the Goblin Creek stock.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ktg

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Tonga Formation of Yeats (1958b) (Late Cretaceous): Greenschist and fine-grained amphibolite-Fine-grained greenschist on Tonga Ridge, but outcrops north of Tye River are fine-grained actinolitic hornblende schist or biotite amphibolite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ktu

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Tonga Formation of Yeats (1958b) (Late Cretaceous): Ultramafic rocks-Serpentine and serpentized peridotite associated with fault bounding the Tonga Formation on west

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kgt

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Gneissic tonalite of Excelsior Mountain (Late Cretaceous)-Light-colored biotite-tonalite gneiss and flaser gneiss, locally massive; contains minor hornblende, muscovite, and clinozoisite and rare garnet and opaque ores. Subhedral to euhedral plagioclase with faint patches of relict euhedral oscillatory zoning and patchy zoning set in mylonitic matrix of quartz, biotite, hornblende, and clinozoisite.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kcb

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Chiwaukum Schist (Late Cretaceous): Biotite schist-Graphitic garnet-biotite-quartz schist, mostly fine- to medium-grained, well-laminated, locally with cordierite, andalusite, staurolite, and (or) kyanite and rare sillimanite. Contains very minor schistose amphibolite. Commonly isoclinally folded on outcrop and microscopic scales, with contorted quartz segregations and veins. Locally has thick veins of quartz and local dikes and sills of foliated, light-colored tonalite. Grades into unit Kca.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kca

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Chiwaukum Schist (Late Cretaceous): Biotite schist and amphibolite-Mostly fine- to medium-grained, well-laminated mica schist similar to unit Kcb but with rare to abundant schistose amphibolite, fine-grained hornblende gneiss, and less common calc-silicate schist and marble. Cut by dikes and sills of light-colored biotite tonalite and pegmatite. Unit in Cadet Creek area [16] elaborately described by Heath (1971, p. 12-55). Grades into unit Kbg

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kbg

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Banded gneiss (Late Cretaceous): Gneiss, schist, and amphibolite-Mostly interlayered heterogeneous light-colored tonalite to granodiorite gneiss, mica schist, and amphibolite similar to the Chiwaukum Schist. Kyanite or sillimanite and staurolite locally abundant; sericite pseudomorphs after aluminum silicates common. Predominantly crystalloblastic. Most common is medium-grained biotite gneiss with slightly porphyroblastic appearance due to anastomosing mica layers surrounding larger plagioclase crystals or aggregate grains. Contacts between gneiss and schist are both sharp and gradational along and across strike. Crosscutting sills, dikes, and irregular bodies of light-colored, fine-grained to pegmatitic tonalite and gneiss are also abundant. Locally migmatitic. Most of unit has 10 percent or more light-colored gneiss.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kbgg

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Banded gneiss (Late Cretaceous): Gneissic biotite granodiorite-Nonbanded homogeneous, light-colored, medium-grained gneissic biotite granodiorite with accessory sphene, allanite, zircon, and locally garnet. Relict euhedral oscillatory zoning in cores of subidioblastic plagioclase.

Potassium feldspar and quartz are interstitial. Textures mostly granoblastic, but locally blastomylonitic. Contacts with schist layers in unit Kbg are parallel, interlayered, or locally crosscutting

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kbgp

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Banded gneiss (Late Cretaceous): Gneissic pyroxene-biotite tonalite-Medium- to coarse-grained gneissic tonalite with conspicuous subhedral biotite books as wide as 8 mm. CI 6-15 (Ford and others, 1988, p. 118) Quartz and potassium feldspar intergranular to crystalloblastic; plagioclase with relict euhedral oscillatory zoning, subhedral clinopyroxene, and minor hornblende. Small amounts of zircon and allanite. Interlayers of biotite schist at margins.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kum

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Ultramafic rocks (Late Cretaceous)-Serpentinized orthopyroxenite (metaperidotite) and serpentinite. Coarse-grained enstatite with skeletal relicts of olivine in lens on ridge north of North Fork of Skykomish River; enstatite replaced by serpentine minerals, talc, and tremolite, especially in foliate zones. Small pods are mostly serpentinized pyroxenite(?) or talc-tremolite rocks.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Ked

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Easton terrane: Easton Metamorphic Suite (Early Cretaceous): Darrington Phyllite (east of Straight Creek Fault)-Black, graphitic sericite-quartz phyllite with quartz exudation lamellae. Strongly mylonitic with new quartz and quartzofeldspathic layers and boudins; thermally metamorphosed with new red-brown biotite. Ellis (1959, p. 8-12) describes two generations of foliation.

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kes

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Easton terrane: Easton Metamorphic Suite (Early Cretaceous): Shuksan Greenschist-Greenschist, actinolite schist, and rare blue-amphibole schist. Strongly schistose and locally well layered. Actinolitic hornblende locally replaces crossite and glaucophane. Glaucophane rims crossite. Pumpellyite, probable sodic pyroxene, and stilpnomelane are common constituents of some rocks. Descriptions adapted from Yeats (1958a, p. 64-70). Highly recrystallized breccia of metagreenstone tuff, greenschist, and phyllitic clasts crops out in Lower Eagle Creek gorge.

Enumerated\_Domain:

Enumerated\_Domain\_Value: KJis

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Ingalls terrane: Ingalls Tectonic Complex (Early Cretaceous or Late Jurassic): Serpentinite and serpentinized metaperidotite-Metamorphic rocks composed of olivine (forsterite), tremolite or talc, and carbonate minerals and serpentine. Frost (1973, p. 8-12) reports that the original ultramafic rocks in Paddy Go Easy Pass area were lherzolite with olivine, enstatite, diopside, and chromite.

Local relict primary layering. Serpentinite, formed prior to intrusion of Mount Stuart batholith, is mostly antigorite with veins of lizardite (Frost, 1973, p. 26). Contact with unit KJim is mapped where subdued topography and gray to bluish-gray serpentinite slopes change to blocky orange outcrops of metaperidotite. In Paddy Go Easy Pass area, contacts are from Frost's (1973, pl. 1 and p. 28-29) serpentine-out isograd. Common foliation in serpentinite not shown on map.

Enumerated\_Domain:

Enumerated\_Domain\_Value: KJim

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Ingalls terrane: Ingalls Tectonic Complex (Early Cretaceous or Late Jurassic): Metaperidotite-Olivine (forsterite)-talc-tremolite rock with minor late serpentine minerals. Forsterite and enstatite also occur with or without anthophyllite close to Mount Stuart batholith (Frost, 1973, p. 29-34). See Frost (1973) for details of petrology and mineralogy.

Enumerated\_Domain:

Enumerated\_Domain\_Value: KJih

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Ingalls terrane: Ingalls Tectonic Complex (Early Cretaceous or Late Jurassic): Hornfels-Foliate and nonfoliate metamorphic rocks ranging from hornfels with relict protolith structure to gneissic amphibolite. Includes hornfelsic pillow basalt, gabbro, diorite, quartz diorite, amphibolite, mafic schist, volcanoclastic rocks, argillite, chert, and rodingite. See Frost (1973, p. 16-22, 43-45) for more details.

Enumerated\_Domain:

Enumerated\_Domain\_Value: wa

Enumerated\_Domain\_Value\_Definition: water

Enumerated\_Domain:

Enumerated\_Domain\_Value: gl

Enumerated\_Domain\_Value\_Definition: glacier

Distribution\_Information:

Resource\_Description: Downloadable Data

Standard\_Order\_Process:

Digital\_Form:

Digital\_Transfer\_Information:

Transfer\_Size: 1.422

Metadata\_Reference\_Information:

Metadata\_Date: 20060914

Spatial\_Data\_Organization\_Information: skylines:

Spatial\_Data\_Organization\_Information:

Direct\_Spatial\_Reference\_Method: Vector

Point\_and\_Vector\_Object\_Information:

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: Entity point

Point\_and\_Vector\_Object\_Count: 18

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: Complete chain

Point\_and\_Vector\_Object\_Count: 75

SDTS\_Terms\_Description:  
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Point\_and\_Vector\_Object\_Count: 45  
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SDTS\_Point\_and\_Vector\_Object\_Type: Label point  
Point\_and\_Vector\_Object\_Count: 25  
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Horizontal\_Coordinate\_System\_Definition:  
Planar:  
Map\_Projection:  
Map\_Projection\_Name: Transverse Mercator  
Transverse\_Mercator:  
Scale\_Factor\_at\_Central\_Meridian: 0.999600  
Longitude\_of\_Central\_Meridian: -123.000000  
Latitude\_of\_Projection\_Origin: 0.000000  
False\_Easting: 500000.000000  
False\_Northing: 0.000000  
Planar\_Coordinate\_Information:  
Planar\_Coordinate\_Encoding\_Method: coordinate pair  
Coordinate\_Representation:  
Abscissa\_Resolution: 0.000128  
Ordinate\_Resolution: 0.000128  
Planar\_Distance\_Units: meters  
Geodetic\_Model:  
Horizontal\_Datum\_Name: D\_Clarke\_1866  
Ellipsoid\_Name: Clarke 1866  
Semi-major\_Axis: 6378206.400000  
Denominator\_of\_Flattening\_Ratio: 294.978698  
Entity\_and\_Attribute\_Information:  
Detailed\_Description:  
Entity\_Type:  
Entity\_Type\_Label: skylines.pat  
Attribute:  
Attribute\_Label: FID  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.  
Attribute:  
Attribute\_Label: Shape  
Attribute\_Definition: Feature geometry.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Coordinates defining the features.  
Attribute:  
Attribute\_Label: AREA  
Attribute\_Definition: Area of feature in internal units squared.

Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Area is always zero for point coverages. Values are automatically generated.

Attribute:  
Attribute\_Label: PERIMETER  
Attribute\_Definition: Perimeter of feature in internal units.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Perimeter is always zero for point coverages. Values are automatically generated.

Attribute:  
Attribute\_Label: SKYLINES#  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: SKYLINES-ID  
Attribute\_Definition: User-defined feature number.  
Attribute\_Definition\_Source: ESRI

Attribute:  
Attribute\_Label: PTYPE

Attribute:  
Attribute\_Label: SEL

Attribute:  
Attribute\_Label: SYMB

Detailed\_Description:  
Entity\_Type:  
Entity\_Type\_Label: skylines.aat

Attribute:  
Attribute\_Label: FID  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:  
Attribute\_Label: Shape  
Attribute\_Definition: Feature geometry.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Coordinates defining the features.

Attribute:  
Attribute\_Label: FNODE#  
Attribute\_Definition: Internal node number for the beginning of an arc (from-node).

Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.  
Attribute:  
Attribute\_Label: TNODE#  
Attribute\_Definition: Internal node number for the end of an arc (to-  
node).  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.  
Attribute:  
Attribute\_Label: LPOLY#  
Attribute\_Definition: Internal node number for the left polygon.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.  
Attribute:  
Attribute\_Label: RPOLY#  
Attribute\_Definition: Internal node number for the right polygon.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Whole numbers that are automatically generated.  
Attribute:  
Attribute\_Label: LENGTH  
Attribute\_Definition: Length of feature in internal units.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Positive real numbers that are automatically  
generated.  
Attribute:  
Attribute\_Label: SKYLINES#  
Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
Unrepresentable\_Domain: Sequential unique whole numbers that are  
automatically generated.  
Attribute:  
Attribute\_Label: SKYLINES-ID  
Attribute\_Definition: User-defined feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute  
Attribute\_Label: LTYPE  
Attribute\_Definition: locations of fold axis, mineral isograd, margin of  
continental ice and cross-section line  
Attribute\_Definition\_Source: Author  
Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: fa

Enumerated\_Domain\_Value\_Definition: Axial trace of fold based on strike and dip of bedding.

Enumerated\_Domain:

Enumerated\_Domain\_Value: fa, concealed

Enumerated\_Domain\_Value\_Definition: Axial trace of fold based on strike and dip of bedding, where beds defining fold are hidden beneath younger unfolded materials

Enumerated\_Domain:

Enumerated\_Domain\_Value: iso

Enumerated\_Domain\_Value\_Definition: Mineral isograd

Enumerated\_Domain:

Enumerated\_Domain\_Value: ice margin

Enumerated\_Domain\_Value\_Definition: margin of continental ice (Canadian ice sheet)

Enumerated\_Domain:

Enumerated\_Domain\_Value: xs

Enumerated\_Domain\_Value\_Definition: Location of cross-sections on printed map.

Attribute:

Attribute\_Label: DESCRIPTION

Attribute\_Definition: additional information about lines on published map such as minerals defining isograd (i.e. sillimanite isograd), letter designation of cross section lines, type of fold axis, etc.

Attribute\_Definition\_Source: Author

Distribution\_Information:

Resource\_Description: Downloadable Data

Standard\_Order\_Process:

Digital\_Form:

Digital\_Transfer\_Information:

Transfer\_Size: 0.042

Metadata\_Reference\_Information:

Metadata\_Date: 20060914

Spatial\_Data\_Organization\_Information: skypoints:

Spatial\_Data\_Organization\_Information:

Direct\_Spatial\_Reference\_Method: Vector

Point\_and\_Vector\_Object\_Information:

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: Entity point

Point\_and\_Vector\_Object\_Count: 90

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: Point

Point\_and\_Vector\_Object\_Count: 45

Entity\_and\_Attribute\_Information:

Detailed\_Description:

Entity\_Type:

Entity\_Type\_Label: skypoints.pat

Attribute:

Attribute\_Label: FID

Attribute\_Definition: Internal feature number.  
Attribute\_Definition\_Source: ESRI  
Attribute\_Domain\_Values:  
    Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:  
    Attribute\_Label: Shape  
    Attribute\_Definition: Feature geometry.  
    Attribute\_Definition\_Source: ESRI  
    Attribute\_Domain\_Values:  
        Unrepresentable\_Domain: Coordinates defining the features.

Attribute:  
    Attribute\_Label: AREA  
    Attribute\_Definition: Area of feature in internal units squared.  
    Attribute\_Definition\_Source: ESRI  
    Attribute\_Domain\_Values:  
        Unrepresentable\_Domain: Area is always zero for point coverages. Values are automatically generated.

Attribute:  
    Attribute\_Label: PERIMETER  
    Attribute\_Definition: Perimeter of feature in internal units.  
    Attribute\_Definition\_Source: ESRI  
    Attribute\_Domain\_Values:  
        Unrepresentable\_Domain: Perimeter is always zero for point coverages. Values are automatically generated.

Attribute:  
    Attribute\_Label: SKYPOINTS#  
    Attribute\_Definition: Internal feature number.  
    Attribute\_Definition\_Source: ESRI  
    Attribute\_Domain\_Values:  
        Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:  
    Attribute\_Label: SKYPOINTS-ID  
    Attribute\_Definition: User-defined feature number.  
    Attribute\_Definition\_Source: ESRI

Attribute:  
    Attribute\_Label: PTTYPER  
Attribute\_Definition: location points for samples dated by isotope methods, fossils, approx. center of morainal embankments, outcrops of limestone or ultramafic rock to small to show at map scale.  
    Attribute\_Definition\_Source: Author  
    Attribute\_Domain\_Values:  
        Enumerated\_Domain:  
            Enumerated\_Domain\_Value: fossil locality  
            Enumerated\_Domain\_Value\_Definition: Fossil locality keyed by map number to Table 1, I-1963 (<http://pubs.usgs.gov/imap/i1963/>)  
        Enumerated\_Domain:

Enumerated\_Domain\_Value: age sample

Enumerated\_Domain\_Value\_Definition: Location of sample dated by isotope analysis, keyed by map number to Table 2, I-1963 (<http://pubs.usgs.gov/imap/i1963/>)

Enumerated\_Domain:

Enumerated\_Domain\_Value: morbank

Enumerated\_Domain\_Value\_Definition: Approximate center of morainal embankment

Enumerated\_Domain:

Enumerated\_Domain\_Value: um

Enumerated\_Domain\_Value\_Definition: Location of ultramafic rock outcrop too small to show at map scale. Includes : PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks-Serpentinized peridotite, Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks-Highly altered pods of pyroxenite, peridotite, and serpentinized dunite are tectonically intercalated with argillite and ribbon chert near Merchant Peak. See Yeats (1958a, p. 116-119) for further discussion of that area. Schistose ultramafite east of Weden Creek consists of forsterite in mesh of antigorite. Olivine is locally converted to phlogopite near Tertiary plutons. In Sultan Basin area Dungan (1974, p. 40-41) describes peridotite hornfels on Red Mountain with assemblage of forsterite-talc-tremolite-chlorite within 2.5 km of contact with Index batholith. North of quadrangle, ultramafic rocks on strike with this layer are serpentinized cumulus peridotite with relict olivine and orthopyroxene associated locally with layered gabbro (Dungan, 1974, p. 48-62), Nason terrane: Ultramafic rocks (Late Cretaceous)-Serpentinized orthopyroxenite (metaperidotite) and serpentinite. Coarse-grained enstatite with skeletal relicts of olivine in lens on ridge north of North Fork of Skykomish River; enstatite replaced by serpentine minerals, talc, and tremolite, especially in foliate zones. Small pods are mostly serpentinized pyroxenite(?) or talc-tremolite rocks, and Tonga Formation of Yeats (1958b) (Late Cretaceous): Ultramafic rocks-Serpentine and serpentinized peridotite associated with fault bounding the Tonga Formation on west.

Enumerated\_Domain:

Enumerated\_Domain\_Value: ls

Enumerated\_Domain\_Value\_Definition: Location of limestone or marble outcrop too small to show at map scale. Includes : PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Marble-Black to bluish-gray marble and, in part, interbedded chert and shale occurring as steeply dipping pods and lenticular beds, Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Marble-Lenticular beds and pods of banded, white to grayish, medium- to fine-grained crystalline marble intercalated with metachert and greenstone; in part, shaly laminations or graphitic impurities mark bedding planes. Silicified replacement masses (Danner, 1966, p. 374; Yeats, 1958a, p. 103), and Nason terrane: Chiwaukum Schist (Late Cretaceous): Marble-Small, coarsely crystalline gray lenses in schist east of Mill Creek

Attribute:

Attribute\_Label: SAMPNO

Attribute\_Definition: Field number of rock sample with described fossils or isotopically analysed for age.

Attribute\_Definition\_Source: Author

Attribute:

Attribute\_Label: AGE

Attribute\_Definition: age(s) of samples dated by radiometric or fission track methods. See Table 2 in published text keyed to mapno

(<http://pubs.usgs.gov/imap/i1963/>)

Attribute:

Attribute\_Label: UNIT

Attribute\_Definition: Source unit of sample or unit symbol of small outcrop or morainal embankment.

Attribute\_Definition\_Source: Author

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Bald Mtn. pluton

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Bald Mountain pluton (age uncertain)-Medium- to coarse-grained, hypidiomorphic biotite granodiorite and granite, in part gneissic near the margins. Accessory cordierite, mostly altered to pinitite, and rare garnet. Locally cataclastic. Clinopyroxene rimmed with hornblende; intergranular quartz and potassium feldspar graphically intergrown.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Barlow Pass(?) Volca

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Barlow Pass Volcanics of Vance (1957b) (late and middle Eocene): South of Skykomish, rocks that we mapped as Barlow Pass(?) Volcanics are mostly heterogeneous, light-tan to dark-gray-green, rhyolitic to andesitic breccia and feldspar porphyry. Rocks identified as andesite in the field generally contain at least trace amounts of quartz in thin section. Crystal-rich andesite and dacite breccia contains andesite, dacite, and rhyolite clasts, sandstone, metasedimentary rocks, chert, siltstone, quartz, foliated polycrystalline quartz, potassium feldspar, and plagioclase. Crystal-rich greenish rhyodacite breccia has platy cleavage. Amygdaloidal andesite(?) and andesite(?) porphyry, in part having crude columns, are also present. Plagioclase is commonly altered to calcite and chlorite. Pyrite is locally present. Further details given by Yeats (1958a, p. 152-161). Includes probable intrusive rhyolite porphyry on Money Creek. Many volcanic rocks in the Barlow Pass(?) Volcanics are partly to strongly recrystallized by nearby Tertiary plutons

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Beckler Pk.stock

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Granodiorite of the Beckler Peak stocks-Biotite granodiorite, hypidiomorphic granular to xenomorphic with microcline microperthite. Mostly CI 5-9, but Yeats (1958a, p. 75) reports some

rocks with as much as 18 percent mafic minerals. Stocks are commonly highly sheared and cataclastic

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Breccia of Kyes Peak

Enumerated\_Domain\_Value\_Definition: : TERTIARY BEDROCK: Breccia of Kyes Peak (Miocene)-Mostly andesite and dacite breccia beds with abundant clasts of schist, gneiss, and granitoid rocks. Rare two-pyroxene andesite, dacite, and rhyolite flows. Monolithologic breccias consist predominantly of fine-grained mica schist or granodiorite clasts. Clasts as long as 200 m. Breccia beds range from a few centimeters to more than 50 m in thickness. Thin volcanic to volcanic-lithic-subquartzose-sandstone beds locally near base. Heath (1971, p. 124-125) described probable primary garnets in rhyodacite and dacite flows. Alteration minerals are chlorite, sericite, and epidote. Some rocks, especially those east of Glacier Creek, are thermally metamorphosed and enriched in magnetite, actinolite, and albite(?).

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Chiwaukum Schist

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Nason terrane: Chiwaukum Schist (Late Cretaceous): Biotite schist and amphibolite-Mostly fine- to medium-grained, well-laminated mica schist similar to unit Kcb but with rare to abundant schistose amphibolite, fine-grained hornblende gneiss, and less common calc-silicate schist and marble. Cut by dikes and sills of light-colored biotite tonalite and pegmatite.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: dike in Tpa

Enumerated\_Domain\_Value\_Definition: Dike intruding Volcanic rocks of Mount Persis.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Eagle Tuff

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Eagle Tuff of Yeats (1977) (Miocene)-Brown to gray-brown rhyolitic to dacitic tuff, ash-flow tuff, and breccia. Conspicuous quartz phenocrysts are set in clastic matrix of plagioclase and silicic volcanic rock; some glassy shards. Abundant fragments of pre-Tertiary country rock present in unit. Poor sorting. Bedding inconspicuously shown by flattened pumice clasts and local thin layers of tuff

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Eastern melange belt

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Migmatitic gneiss-Fine-grained schistose amphibolite to medium- and coarse-grained massive quartz diorite with layered hornblende gneiss, gneissose quartz diorite, trondhjemitic, and replacement breccia and minor serpentized ultramafite. Amphibolite is crystalloblastic with xenoblastic unzoned and untwinned andesine, brown to

brownish-green xenoblastic hornblende, and accessory sphene, apatite, magnetite, ilmenite, and zircon. Rocks grade through hornblende gneiss to gneissose quartz diorite; commonly mafic and less mafic rocks in irregular, intimately mixed layers. All exposures cut by anastomosing shear zones; rocks cataclastically deformed prior to late static recrystallization. Description modified from Yeats (1958a, p. 83-99; 1964, p. 552-555) AND Metatonalite-Altered medium-grained metatonalite. Subhedral plagioclase, mostly anhedral and intergranular mosaics of quartz and small amounts of altered green hornblende and perthitic potassium feldspar. Locally cataclastic.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Fuller Mtn. plug

Enumerated\_Domain\_Value\_Definition: : TERTIARY BEDROCK: Fuller Mountain plug (early Eocene)-Gray, highly jointed, hornblende-biotite-clinopyroxene granodiorite. Clinopyroxene rimmed with hornblende; intergranular quartz and potassium feldspar graphically intergrown(?).

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Gneissic tonalite

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Gneissic tonalite of Excelsior Mountain (Late Cretaceous)-Light-colored biotite-tonalite gneiss and flaser gneiss, locally massive; contains minor hornblende, muscovite, and clinozoisite and rare garnet and opaque ores. Subhedral to euhedral plagioclase with faint patches of relict euhedral oscillatory zoning and patchy zoning set in mylonitic matrix of quartz, biotite, hornblende, and clinozoisite.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Grotto batholith

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Grotto batholith: Biotite-hornblende granodiorite and granite (Miocene and Oligocene)-Medium-grained hypidiomorphic-granular granodiorite and granite with subhedral to euhedral, oscillatory zoned plagioclase in matrix of optically continuous quartz or anhedral quartz and perthite; some granopyhric textures. CI 10-20. Relic pyroxene in uralitic pale-green hornblende. Many rocks extensively altered to chlorite, epidote, and sphene; some crosscutting fractures filled with alteration minerals. Fine-grained mafic inclusions common. Includes some areas underlain by rocks similar to the granite of San Juan Creek. North end of pluton and smaller stocks in Monte Cristo area are more mafic and mostly granodiorite and tonalite

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Index batholith

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Index batholith: Granodiorite and tonalite (Oligocene)-Mostly biotite-hornblende and hornblende-biotite granodiorite and tonalite but locally ranges from quartz diorite and quartz monzonite to rare granite; CI 2-30. Medium-grained hypidiomorphic-granular texture; granofelsic, mostly anhedral quartz is interstitial to subhedral and euhedrally oscillatory zoned from labradorite or

andesine to oligoclase (see Yeats, 1958a, p. 202-203; Griffis, 1977, p. 85). Pyroxene is rare and mostly present as tiny rounded inclusions in plagioclase AND Granodiorite and granite of the Sunday Creek stock (Oligocene)-Granodiorite and granite similar to unit Tig but highly altered to sericite, epidote, and chlorite. Bethel (1951, p. 147) reported some micrographic and local granoblastic textures. Locally cataclastic.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Misc. volcanic rocks

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Cady Ridge (Pliocene and Miocene): Breccia and flows-Porphyrific hornblende-hypersthene andesite and (or) dacite in flows and breccias. Rocks commonly highly altered to smectite.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Mt Stuart batholith

Enumerated\_Domain\_Value\_Definition: : PRE-TERTIARY BEDROCK: Rocks of the Mount Stuart batholith (Late Cretaceous): Tonalite and granodiorite of the western pluton-Predominantly medium-grained, hypidiomorphic-granular hornblende-biotite tonalite and subordinate granodiorite. CI 4-15, based on normative mineral data from Erikson (1977b and written commun., 1978). Hornblende locally uralitic around clinopyroxene relicts; potassium feldspar crystallized late and replaces plagioclase with some myrmekite developed. Massive to gneissic near margins, Tonalite and granodiorite of the western pluton: Tonalite of Harding Mountain-Fine- to medium-grained biotite-hornblende tonalite, commonly with crystalloblastic patches of actinolitic hornblende and biotite; CI 12-18. Hypidiomorphic-granular, rich in matrix quartz. Local cumulate layering of hornblende and plagioclase. Outcrops tend to be highly jointed and disintegrate into 10- to 20-cm blocks in extensive talus, AND Tonalite and granodiorite of the eastern pluton-Predominantly medium-grained, hypidiomorphic-granular hornblende-biotite tonalite and subordinate granodiorite. Similar to unit Ksw, although parts of the eastern pluton are somewhat more mafic than western pluton. CI 3-30, based on normative minerals and modal analyses by Erikson (1977b and written commun. 1978).

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Shuksan Greenschist

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Easton terrane: Easton Metamorphic Suite (Early Cretaceous): Shuksan Greenschist-Greenschist, actinolite schist, and rare blue-amphibole schist. Strongly schistose and locally well layered. Actinolitic hornblende locally replaces crossite and glaucophane. Glaucophane rims crossite. Pumpellyite, probable sodic pyroxene, and stilpnomelane are common constituents of some rocks. Descriptions adapted from Yeats (1958a, p. 64-70). Highly recrystallized breccia of metagreenstone tuff, greenschist, and phyllitic clasts crops out in Lower Eagle Creek gorge.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Silver Creek stock

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Tonalite of Silver Creek (Miocene)-Biotite-hornblende and hornblende-biotite tonalite forming small stocks, plugs, and dikes. Texture is hypidiomorphic to porphyritic granular. Mafic minerals are considerably altered to chlorite and epidote.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Snoqualmie batholith

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Rocks of the Snoqualmie batholith: Tonalite and granodiorite (Miocene and Oligocene)-Biotite-hornblende tonalite and granodiorite, medium-grained, mostly equigranular, with hypidiomorphic texture; locally contains clinopyroxene. Mostly light-colored (CI 9-24), coarsely jointed rock. Description adapted from Erikson (1969, p. 2218-2219), Mafic diorite and gabbro (Miocene and Oligocene)-Biotite-hornblende diorite and gabbro; includes some mafic pyroxene-bearing tonalite and quartz diorite. CI 20-40 (Erikson, 1969, p. 2217), AND Granite of Mount Hinman (Miocene and Oligocene)-Hornblende-biotite and two-pyroxene granite; CI 6-15. Generally medium grained, hypidiomorphic granular, but commonly has mesostasic quartz or micrographic texture between larger grains. Rocks commonly altered, containing chlorite and epidote. Description modified from Erikson (1969, p. 2222).

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Vol.rks Mt.Persis

Enumerated\_Domain\_Value\_Definition: : TERTIARY BEDROCK: Volcanic rocks of Mount Persis (late Eocene): Andesite flows, tuffs, and breccia, containing minor dacite and basalt, and minor volcanoclastic sandstone, conglomerate, and siltstone-Massive, dark-green to black, plagioclase-porphyritic two-pyroxene andesite and andesitic breccia and tuff. Phenocrysts and glomerocrysts of plagioclase, clinopyroxene, hypersthene, mostly greatly altered in an intersertal to holocrystalline groundmass of mainly clinopyroxene, plagioclase, and opaque minerals. Black basalt is aphyric to microporphyritic, commonly trachytoid, and locally with altered olivine. Upper part of unit includes rare interbedded, dark-gray to brownish volcanic sandstone and siltstone. Danner (1957, p. 471-472) reports andesite conglomerate interbeds in Youngs Creek. Generally poorly indurated volcanic sandstone contains angular to rounded clasts of volcanic rocks, altered glass, and plagioclase crystals; also contains clasts of chert, sandstone, and siltstone. Variably altered to smectites, epidote, and calcite. Locally hornfelsic near Tertiary plutons, most extensively south of Youngs Creek stock, AND Hornblende dacite breccia-Light-green hornblende dacite breccia composed mainly of andesitic clasts, euhedral plagioclase (in part altered to epidote), tan to olive-green hornblende, clinopyroxene altered to smectites, resorbed quartz, and opaque mineral grains in altered partially devitrified glassy matrix

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Vol.rks.Mt.Daniel

Enumerated\_Domain\_Value\_Definition: TERTIARY BEDROCK: Volcanic rocks of Mount Daniel (Oligocene): Dacite, andesite, and rhyolite-Clinopyroxene and hypersthene-clinopyroxene dacite, andesite, and rhyolite in flows, breccia, tuff, dikes, and sills. Rocks commonly highly altered to smectites and (or) calcite on the south and epidote, chlorite, and locally prehnite on the north. Bedding obscure; welded tuff locally shows flattening, and tuff is locally interbedded with volcanic sandstone and siltstone.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Western melange belt

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metagabbro, minor gneissic amphibolite, and rare gabbro flaser gneiss-Massive to foliated, fine- to medium-grained metagabbro. Many outcrops sheared on all scales. In massive rocks, euhedral, mottled, locally crushed plagioclase, intergranular to euhedral uralitized clinopyroxene, and opaque minerals are common. Mafic metagabbro on Woods Creek bears relicts of hypersthene and clinopyroxene. Sheared rocks range from flaser gabbro with plagioclase cataclasts in schistose, chloritic matrix to well-recrystallized greenstone, greenschist, or amphibolite, locally banded. Most metamorphic minerals are uralite, chlorite, epidote, sphene, carbonate, prehnite, and pumpellyite in metagabbro and metadiabase. Unit includes minor hornblende metatonalite, metaquartz diorite, and minor feldspathic hornblendite AND Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Metatonalite-Fine- to coarse-grained porphyroclastic metatonalite, locally sheared into light-colored cataclastic chlorite gneiss. Predominantly composed of plagioclase and quartz (in part secondary) with actinolitic hornblende, epidote, and chlorite. Occurs mostly as small bodies generally associated with metagabbro.

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: West.andEast melange

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Argillite and graywacke-Pervasively sheared, scaly matrix of mostly argillite containing steep-sided, outcrop- to mountain-sized phacoids of purplish, reddish, gray, and black, fine- to coarse-grained and pebbly, lithofeldspathic, volcanolithic, and subquartzose sandstone interbedded with black argillite. Sandstone has clasts mostly of plagioclase, chert, volcanic rocks, and quartz. Also abundant are grains of sandstone, siltstone, phyllite, biotite, muscovite, and epidote. Where more strongly deformed, unstable grains are broken down into anastomosing shear zones or smeared out into indistinct chloritic matrix. Alteration minerals are calcite, chlorite, sericite, limonite, epidote, and prehnite. Near Tertiary plutons the rocks have become hornfelsic, commonly with conspicuous biotite. Sedimentary features such as graded bedding and load casts are locally well preserved. Unit includes minor chert, polymictic and quartz-pebble conglomerate, and shale-chip breccia; also very minor chert, limestone, metavolcanic rocks, metagabbro, and metatonalite. Locally cut by greenstone (metadiabase) dikes, Potassium-feldspar-bearing sandstone-Lithologically similar

to sandstone of unit TKwa but having 2-20 percent potassium-feldspar clasts and commonly more plagioclase, muscovite, and biotite, Marble-Black to bluish-gray marble and, in part, interbedded chert and shale occurring as steeply dipping pods and lenticular beds. Thin, green tuffaceous chert beds crop out in marble at Haystack quarry on Proctor Creek, Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Chert and metachert-Intensely folded, white to cream or gray, ribbon chert and medium- to fine-grained banded quartzite (metachert); alternating with thin to thick, dark-brown to black layers of calcareous argillite, AND Marble-Lenticular beds and pods of banded, white to grayish, medium- to fine-grained crystalline marble intercalated with metachert and greenstone; in part, shaly laminations or graphitic impurities mark bedding planes. Silicified replacement masses (Danner, 1966, p. 374; Yeats, 1958a, p. 103).

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwm see DMU

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Marble: see Description of Map Units

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKem see DMU

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Marble: see Description of Map Units

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kcm see DMU

Enumerated\_Domain\_Value\_Definition: : PRE-TERTIARY BEDROCK: Nason terrane: Chiwaukum Schist (Late Cretaceous): Marble: see Description of Map Units

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKeu see DMU

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the eastern melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks: see Description of Map Units

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: TKwu see DMU

Enumerated\_Domain\_Value\_Definition: PRE-TERTIARY BEDROCK: Rocks of the western melange belt (early Tertiary to mid-Cretaceous): Ultramafic rocks see Description of Map Units

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kum see DMU

Enumerated\_Domain\_Value\_Definition: : PRE-TERTIARY BEDROCK: Nason terrane: Chiwaukum Schist (Late Cretaceous): Ultramafic rocks: see Description of Map Units

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Spatial\_Data\_Organization\_Information:

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SDTS\_Point\_and\_Vector\_Object\_Type: Complete chain

Point\_and\_Vector\_Object\_Count: 0

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SDTS\_Point\_and\_Vector\_Object\_Type: Point

Point\_and\_Vector\_Object\_Count: 45

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SDTS\_Point\_and\_Vector\_Object\_Type: Label point

Point\_and\_Vector\_Object\_Count: 1043

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Semi-major\_Axis: 6378206.400000

Denominator\_of\_Flattening\_Ratio: 294.978698

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Unrepresentable\_Domain: Sequential unique whole numbers that are automatically generated.

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Attribute\_Label: Shape

Attribute\_Definition: Feature geometry.

Attribute\_Definition\_Source: ESRI

Attribute\_Domain\_Values:

Unrepresentable\_Domain: Coordinates defining the features.

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Attribute\_Definition: Area of feature in internal units squared.

Attribute\_Definition\_Source: ESRI

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Unrepresentable\_Domain: Area is always zero for point coverages. Values are automatically generated.

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Attribute\_Label: PTTYPER

Attribute\_Definition: strike and dip of planar structures and bearing and plunge of linear structures

Attribute\_Definition\_Source: Author

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bedding; top direction known
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  Attribute_Definition: Dip of planar structure (angle of plane to horizontal) or
plunge of lineation (angle of lineation to horizontal)
  Attribute_Definition_Source: Author

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Attribute\_Definition: Feature geometry.  
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Attribute\_Definition\_Source: ESRI  
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Attribute\_Definition: Perimeter of feature in internal units.  
Attribute\_Definition\_Source: ESRI  
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Values are automatically generated.

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automatically generated.

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Attribute:  
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Attribute\_Definition\_Source: Author  
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Marblemount, WA

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Cascades National Park, Marblemount, WA

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    Enumerated\_Domain:  
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collection site in archive; some with thin section

Attribute\_Label: SAMPNO  
Attribute\_Definition: Field number of sample  
Attribute\_Definition\_Source: Author

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Attribute\_Definition: number indicating category (archival or store, etc.)  
and existence of thin section for sample  
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Attribute\_Domain\_Values:  
    Enumerated\_Domain:  
        Enumerated\_Domain\_Value: 1  
        Enumerated\_Domain\_Value\_Definition: archival sample, no thin section

Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: 2  
Enumerated\_Domain\_Value\_Definition: archival sample with thin section

Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: 3  
Enumerated\_Domain\_Value\_Definition: stored sample without thin section

Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: 4  
Enumerated\_Domain\_Value\_Definition: stored sample with thin section

Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: 6  
Enumerated\_Domain\_Value\_Definition: multiple samples at collection site. Some may have thin sections (see description field below)

Attribute:  
Attribute\_Label: DESCRIPTION  
Attribute\_Definition: additional information about sample, includes, comments on lithology, age, references, etc. For "combine" samples, identifies those with thin sections  
Attribute\_Definition\_Source: Author

Attribute:  
Attribute\_Label: UNIT  
Attribute\_Definition: Source unit of sample  
Attribute\_Definition\_Source: Author  
Attribute\_Domain\_Values:  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: Bald Mountain pluton  
Enumerated\_Domain\_Value\_Definition: Bald Mountain pluton; number of samples of this unit = 9; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: Barlow Pass Volcanic Rocks: sed. rock  
Enumerated\_Domain\_Value\_Definition: Barlow Pass Volcanics of Vance (1957b): Sandstone; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: Barlow Pass Volcanic Rocks: vol.rock  
Enumerated\_Domain\_Value\_Definition: Barlow Pass Volcanics of Vance (1957b): Volcanic rocks; number of samples of this unit = 18; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>  
Enumerated\_Domain:  
Enumerated\_Domain\_Value: Barlow Pass:mineralized quartz vein

Enumerated\_Domain\_Value\_Definition: Barlow Pass Volcanics of Vance;  
number of samples of this unit = 1; for description see downloadable pdf of  
Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Breccia of Kyes Peak

Enumerated\_Domain\_Value\_Definition: Breccia of Kyes Peak; number of  
samples of this unit = 9; for description see downloadable pdf of Description of  
Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Chiwaukum Schist

Enumerated\_Domain\_Value\_Definition: Chiwaukum Schist; number of  
samples of this unit = 15; for description see downloadable pdf of Description  
of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Eagle Tuff of Yeats(1977)

Enumerated\_Domain\_Value\_Definition: Eagle Tuff of Yeats (1977); number  
of samples of this unit = 2; for description see downloadable pdf of Description  
of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Eastern melange belt

Enumerated\_Domain\_Value\_Definition: Rocks of the eastern melange belt:  
Mafic metavolcanicrocks, chert, argillite, and graywacke, Chert and metachert,  
and Metadiabase; number of samples of this unit = 20; for description see  
downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Fuller Mountain plug

Enumerated\_Domain\_Value\_Definition: Fuller Mountain plug; number of  
samples of this unit = 1; for description see downloadable pdf of Description of  
Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Gneissic tonalite of Excelsior Mtn.

Enumerated\_Domain\_Value\_Definition: Gneissic tonalite of Excelsior  
Mountain; number of samples of this unit = 5; for description see downloadable  
pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Grotto batholith

Enumerated\_Domain\_Value\_Definition: Rocks of the Grotto batholith:  
Biotite-hornblende granodiorite and granite, Gabbro, quartz gabbro, and pyroxene  
porphyry, Granite of San Juan Creek, and Contact breccia; number of samples of  
this unit = 10; for description see downloadable pdf of Description of Map  
Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Grotto batholith: Monte Cristo stock

Enumerated\_Domain\_Value\_Definition: Rocks of the Grotto batholith:  
Biotite-hornblende granodiorite and granite; number of samples of this unit = 1;  
for description see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Index batholith  
Enumerated\_Domain\_Value\_Definition: Rocks of the Index batholith:  
Granodiorite and tonalite; number of samples of this unit = 5; for description  
see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Index batholith: Goblin Cr. stock  
Enumerated\_Domain\_Value\_Definition: Rocks of the Index batholith:  
Granodiorite of the Goblin Creek stock; number of samples of this unit = 2; for  
description see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Index batholith: Youngs Cr. stock  
Enumerated\_Domain\_Value\_Definition: Rocks of the Index batholith:  
Granodiorite and tonalite; number of samples of this unit = 2; for description  
see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Index batholith: Sunday Cr. Stock  
Enumerated\_Domain\_Value\_Definition: Rocks of the Index batholith:  
Granodiorite and granite of the Sunday Creek stock; number of samples of this  
unit = 2; for description see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Ingalls Tectonic Complex  
Enumerated\_Domain\_Value\_Definition: Ingalls Tectonic Complex; number  
of samples of this unit = 3; for description see downloadable pdf of Description  
of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Misc.gabbro; Money Creek  
Enumerated\_Domain\_Value\_Definition: Gabbro; number of samples of this  
unit = 4; for description see downloadable pdf of Description of Map Units:  
<http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Mount Stuart batholith  
Enumerated\_Domain\_Value\_Definition: Rocks of the Mount Stuart  
batholith; number of samples of this unit = 5; for description see downloadable  
pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Nason Ridge Migmatitic Gneiss  
Enumerated\_Domain\_Value\_Definition: Banded gneiss: Gneiss, schist, and  
amphibolite; number of samples of this unit = 5; for description see  
downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:  
Enumerated\_Domain\_Value: Olivine basalt of North Fork  
Enumerated\_Domain\_Value\_Definition: Basalt flows and cones; number of  
samples of this unit = 2; for description see downloadable pdf of Description of  
Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Shuksan Greenschist

Enumerated\_Domain\_Value\_Definition: Easton Metamorphic Suite: Shuksan Greenschist; number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Sloan Creek plutons

Enumerated\_Domain\_Value\_Definition: Tonalite gneiss of the Sloan Creek plutons; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Snoqualmie batholith

Enumerated\_Domain\_Value\_Definition: Rocks of the Snoqualmie batholith; number of samples of this unit = 11; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Snoqualmie batholith: Mt Hindman stock

Enumerated\_Domain\_Value\_Definition: Rocks of the Snoqualmie batholith : Granite of Mount Hinman; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Swauk Formation

Enumerated\_Domain\_Value\_Definition: Swauk Formation: Sandstone and conglomerate; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Swauk: Silver Pass Vol. Member

Enumerated\_Domain\_Value\_Definition: Swauk Formation: Silver Pass Volcanic Member; number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tonalite of Silver Creek

Enumerated\_Domain\_Value\_Definition: Tonalite of Silver Creek; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Tonga Fm of Yeats (1958)

Enumerated\_Domain\_Value\_Definition: Tonga Formation of Yeats (1958b); number of samples of this unit = 20; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Volcanic rocks (Mount Treen)

Enumerated\_Domain\_Value\_Definition: Volcanic rocks; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Volcanic rocks of Mount Persis

Enumerated\_Domain\_Value\_Definition: Volcanic rocks of Mount Persis;  
number of samples of this unit = 30; for description see downloadable pdf of  
Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Volcanic rocks of Mt. Daniel

Enumerated\_Domain\_Value\_Definition: Volcanic rocks of Mount Daniel;  
number of samples of this unit = 5; for description see downloadable pdf of  
Description of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: Western melange belt

Enumerated\_Domain\_Value\_Definition: Rocks of the western melange belt:  
Argillite and graywacke, Potassium-feldspar-bearing sandstone, Metavolcanic  
rocks, Metatonalite, and Slate, phyllite, and semischist; number of samples of  
this unit = 29; for description see downloadable pdf of Description of Map  
Units: <http://pubs.usgs.gov/imap/i1963/>

Enumerated\_Domain:

Enumerated\_Domain\_Value: WMB: metagabbro

Enumerated\_Domain\_Value\_Definition: Rocks of the western melange belt:  
Metagabbro, minor gneissic amphibolite, and rare gabbro flaser gneiss; number of  
samples of this unit = 18; for description see downloadable pdf of Description  
of Map Units: <http://pubs.usgs.gov/imap/i1963/>

Attribute:

Attribute\_Label: COUNTY2

Attribute\_Definition: County in Washington State where sample collected

Attribute\_Definition\_Source: Author

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Chel

Enumerated\_Domain\_Value\_Definition: Chelan County

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: King

Enumerated\_Domain\_Value\_Definition: King County

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kitt

Enumerated\_Domain\_Value\_Definition: Kittitas County

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Snoh

Enumerated\_Domain\_Value\_Definition: Snohomish County

Distribution\_Information:

Distributor:

Contact\_Information:

Contact\_Person\_Primary:

Contact\_Person: Database Coordinator

Contact\_Organization: U.S. Geological Survey

Contact\_Address:

Address\_Type: mailing address  
Address: 345 Middlefield Rd., M/S 973  
City: Menlo Park  
State\_or\_Province: CA  
Postal\_Code: 94025  
Country: USA

Contact\_Voice\_Telephone: 650-329-4935  
Contact\_Facsimile\_Telephone: 650-329-4936  
Contact\_Electronic\_Mail\_Address: kwheeler@usgs.gov  
Contact\_Instructions:

Resource\_Description: USGS Miscellaneous Investigations Series I-1963 and USGS Data Series, DS-222 consists of both traditional geologic map products and ARC/INFO format geospatial databases. Furthermore, the traditional geologic map products (map sheets and pamphlets) can be obtained either as paper or as PDF files.

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Standard\_Order\_Process:

Digital\_Form:

Digital\_Transfer\_Information:

Format\_Name: Skykomish geologic map as a PDF files

Format\_Specification: Adobe Acrobat Document

Format\_Information\_Content: PDF of geologic map, correlation chart and description of map units

Transfer\_Size: 77.9

Digital\_Transfer\_Option:

Online\_Option:

Computer\_Contact\_Information:

Network\_Address:

Network\_Resource\_Name: <http://pubs.usgs.gov/imap/i1963/>

Digital\_Form:

Digital\_Transfer\_Information:

Format\_Name: accompanying pamphlet as a PDF files

Format\_Specification: Adobe Acrobat Document

Format\_Information\_Content: Introduction, Acknowledgements, Summary of Geologic History, expanded description of rock units, figures including location, generalized geologic map, sources of data, and reference list

Transfer\_Size: 728 KB

Digital\_Transfer\_Option:

Online\_Option:

Computer\_Contact\_Information:

Network\_Address:

Network\_Resource\_Name: <http://pubs.usgs.gov/imap/i1963/>

Digital\_Form:

Digital\_Transfer\_Information:

Format\_Name: skycovers.tar.gz

Format\_Version\_Number: 2

Format\_Version\_Date: 2006

Format\_Specification: ARC/INFO v. 7.1.1

Format\_Information\_Content: 5 ARC/INFO export (.e00) files.

File-Decompression\_Technique: TAR and gzip (see the readme for more information about TAR and gzip).

Transfer\_Size: 5 KB

Digital\_Transfer\_Option:

Online\_Option:

Computer\_Contact\_Information:

Network\_Address:

Network\_Resource\_Name: <http://pubs.usgs.gov/ds/2006/222/>

Fees: No fees for digital forms of the report.

Ordering\_Instructions: Digital files (both PDFs and database files) can be obtained on-line as described above at the publication web-site, or by sending a request to the Database Coordinator at the address shown above.

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Contact\_Organization: USGS Information Services

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Address\_Type: mailing address

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City: Denver

State\_or\_Province: CO

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Country: USA

Contact\_Voice\_Telephone: (303) 202-4200

Contact\_Voice\_Telephone: 1-888-ASK-USGS

Contact\_Facsimile\_Telephone: (303) 202-4695

Contact\_Electronic\_Mail\_Address: [infoservices@usgs.gov](mailto:infoservices@usgs.gov)

Hours\_of\_Service:

Contact\_Instructions:

Resource\_Description: USGS Miscellaneous Investigations I-1963 and USGS Data Series, DS-222 consists of both traditional geologic map products and ARC/INFO format geospatial databases. Furthermore, the traditional geologic map products (map sheets and pamphlets) can be obtained either as paper or as digital files.

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Non-digital\_Form: Paper copies of the map sheets and pamphlet can be obtained by contacting USGS Information Services via the contact information listed above.

Metadata\_Reference\_Information:

Metadata\_Date: 20061029

Metadata\_Contact:

Contact\_Information:

Contact\_Organization\_Primary:

Contact\_Organization: United States Geological Survey

Contact\_Person: Karen L. Wheeler

Contact\_Address:

Address\_Type: 345 Middlefield Rd. MS 975

City: Menlo Park

State\_or\_Province: California

Postal\_Code: 94025

Contact\_Voice\_Telephone: 650-329-4935

Contact\_Facsimile\_Telephone: 650-329-4936

Contact\_Electronic\_Mail\_Address: kwheeler@usgs.gov

Metadata\_Standard\_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata\_Standard\_Version: FGDC-STD-001-1998

Metadata\_Time\_Convention: local time

Metadata\_Extensions:

Online\_Linkage: <http://www.esri.com/metadata/esriprof80.html>

Profile\_Name: ESRI Metadata Profile