

Cheney, E.S., and Hayman, N.W., 2009, The Chiwaukum Structural Low, eastern Cascade Range, Washington, *in* O'Connor, J.E., Dorsey, R.J., and Madin, I.P., eds., *Volcanoes to Vineyards: Geologic Field Trips through the Dynamic Landscape of the Pacific Northwest: Geological Society of America Field Guide 15*, p. 19–52, doi: 10.1130/2009.fld015(02).

INTRODUCTION

This Item provides documentation for the geology shown in Figures 4, 5, and 7 of Cheney and Hayman (2009). Specifically, this item includes copies of maps compiled from the field sheets of parts of nine 1:24,000 quadrangles.

1:24,000 GEOLOGIC MAPS

The only modifications to the original compilations are the printed labels for formations and structures. Because these maps are essentially field sheets, their style and quality obviously are less than that of published geologic maps.

Figure R1 shows the location of the quadrangles and is the explanation for all of the 1:24,000 quadrangles. However, several units that were too small to show in Figures 4 and 5 of Cheney and Hayman (2009) occur on some of the 1:24,000 maps. These are:

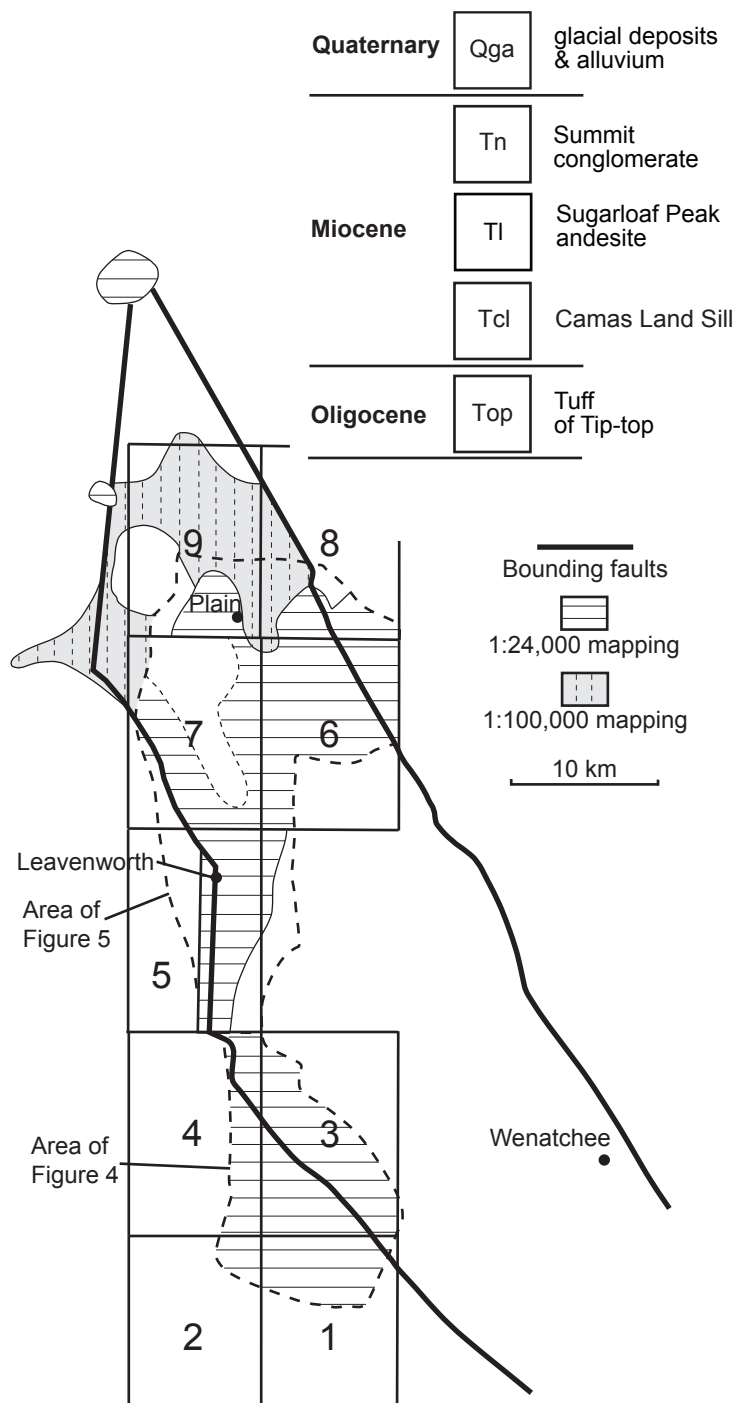
- (1) Qlb: landslide material of Columbia River Basalt in the Blewett Pass quadrangle;
- (2) Qls: landslides in the Leavenworth quadrangle;
- (3) Qga: Quaternary glacial and alluvial sediments are more extensive than shown in Cheney and Hayman (2009);
- (4) Tnl: residual boulders let down by erosion of unit Tn in the Winton quadrangle;
- (5) Tsg: olive, volcanoclastic siltstone in the Swauk Formation in the Blewett Pass quadrangle; and
- (6) Metamorphic rocks in the western parts of the Blewett, Leavenworth, and Winton quadrangles. The ages of these rocks relative to one another are unknown except that Ptu cuts all of the other metamorphic rocks. The metamorphic rocks are:

- PTa: amphibolite
- PTb: biotitic schist
- PTf: felsic metavolcanic rocks
- PTg: greenstone
- PTr: argillite
- PTu: serpentinite (and peridotite)

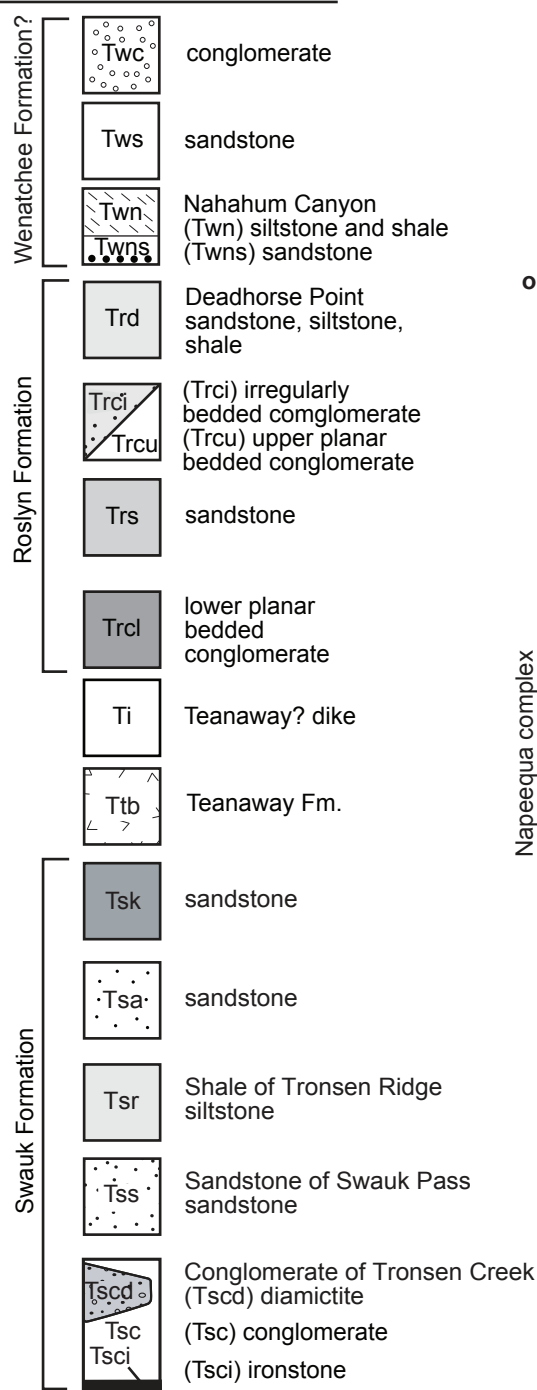
The geology shown on the 1:24,000 maps of the Blewett Pass, Van Creek, and Sugarloaf Peak 1:24,000 quadrangles is modestly more extensive and slightly different than shown in Figures 4, 5, and 7 of Cheney and Hayman (2009). This is because after the field guide was accepted in June 2009, mapping continued to November 2009.

Caption to Figure R1

Figure R1, Index to 1:24,000 geologic maps and most of the lithologic units in and adjacent to the Chiwaukum Structural Low. Additional units are listed in the text of this Item. The 1:24,000 quadrangles are: (1) Blewett Pass (formerly Swauk Pass), (2) Liberty, (3) Tip Top, (4) Blewett, (5) Leavenworth, (6) Van Creek, (7) Winton, (8) Sugarloaf Peak, and (9) Plain.



Eocene



Pre-Tertiary on west side

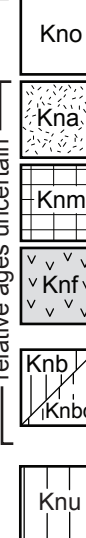


Pre-Tertiary on northeast side



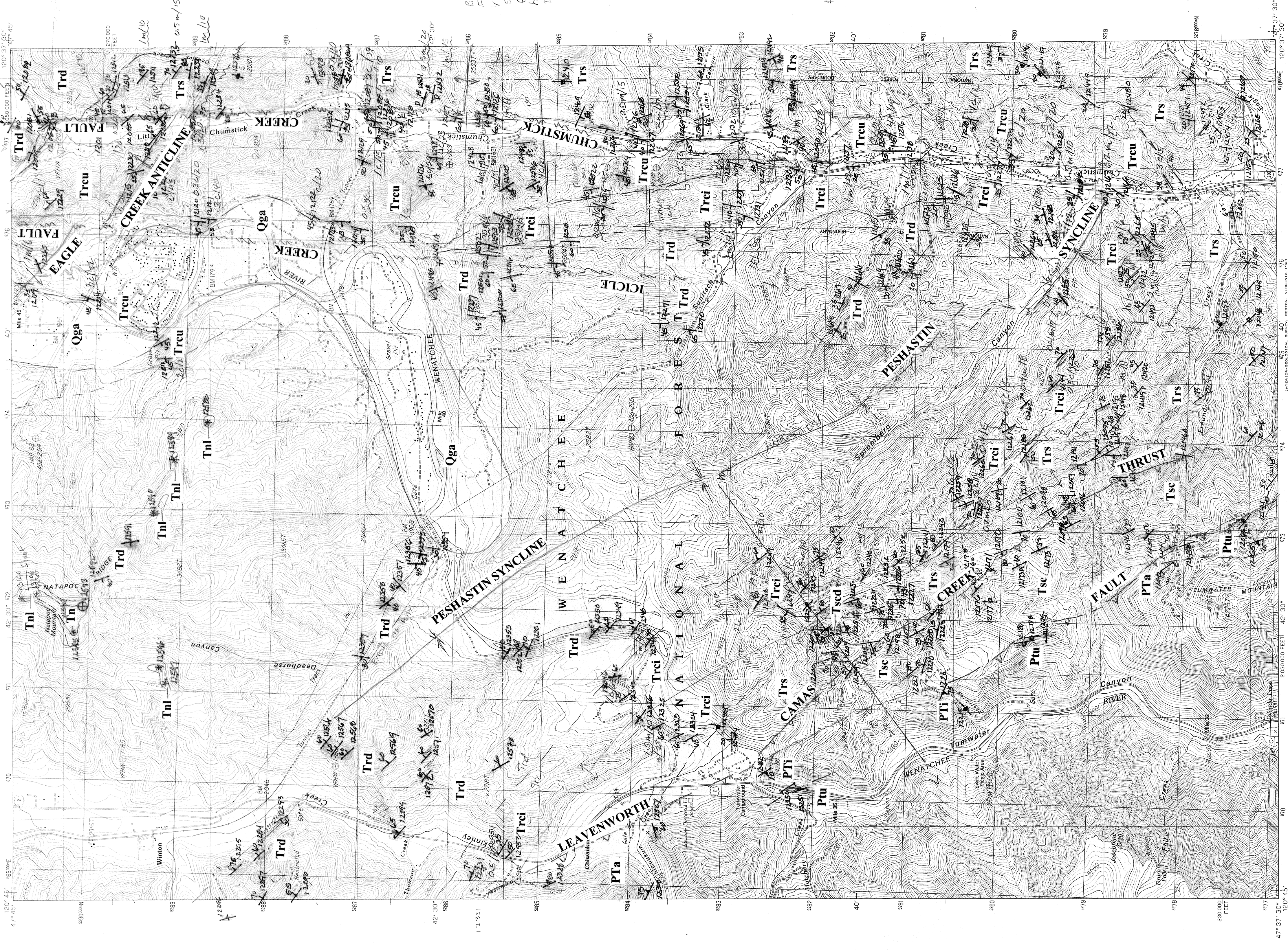
Napeequa complex

relative ages uncertain



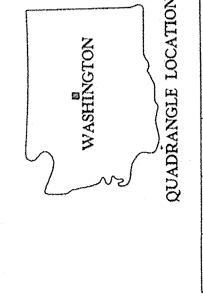
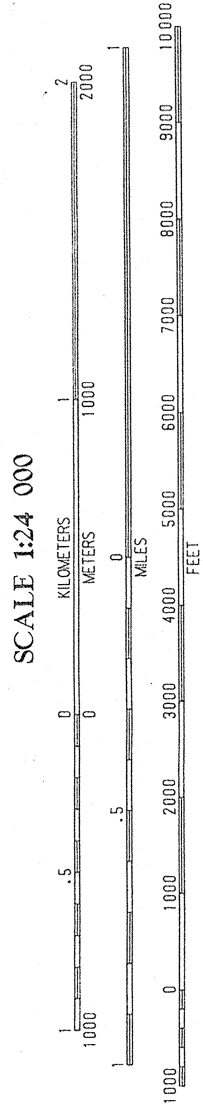
2-12

Field Trip Stop



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN
LIMITED REVISION FROM AERIAL PHOTOGRAPHS TAKEN
FIELD CHECKED
GRIP 100-METER UNIVERSAL TRANSVERSE MERCATOR
1000-FOOT STATE GRID TICKS
VERTICAL DATUM
To place on the predicted North American Datum of 1983,
C2) meters and 89 meters.

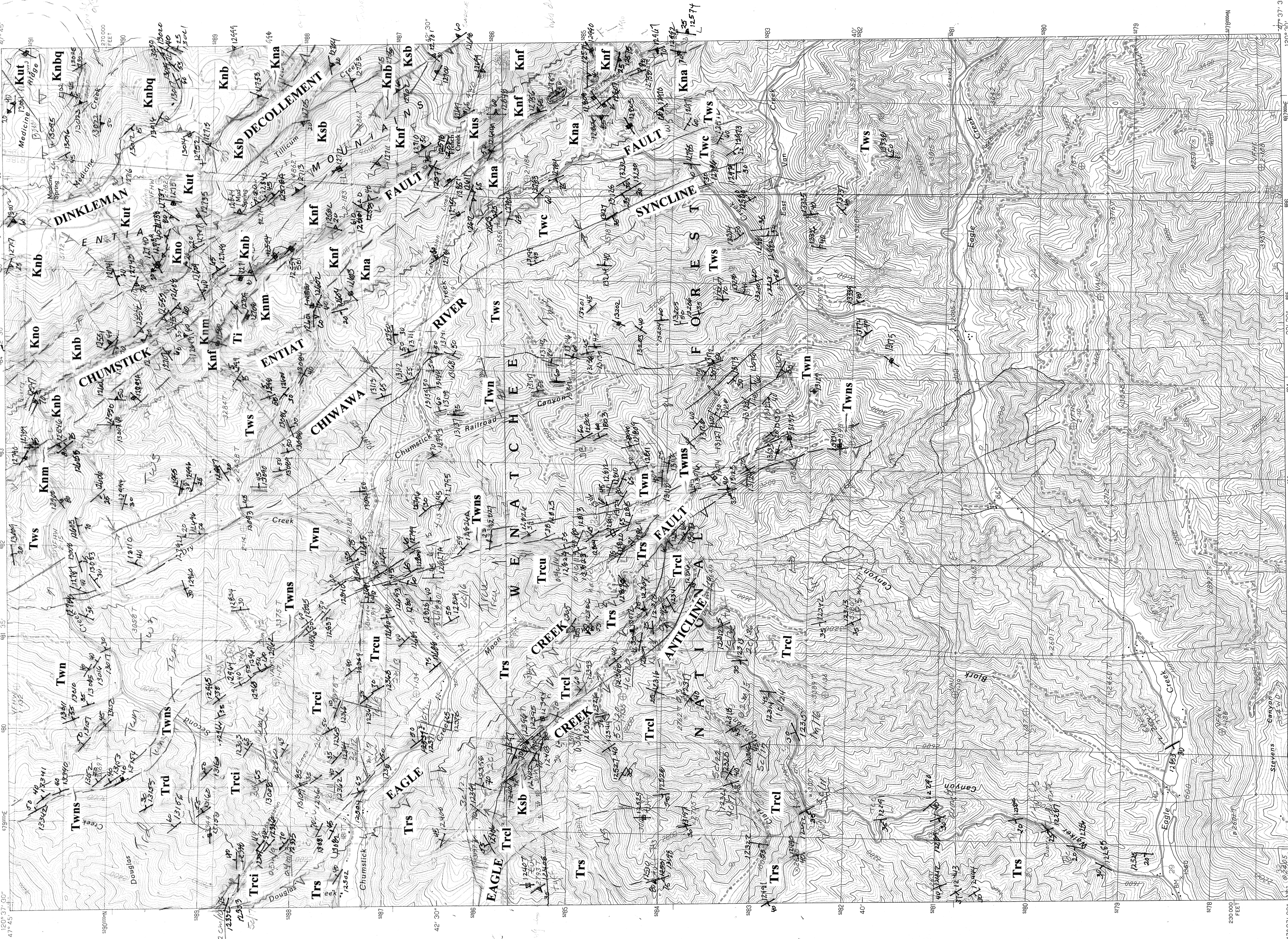
PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
field check.



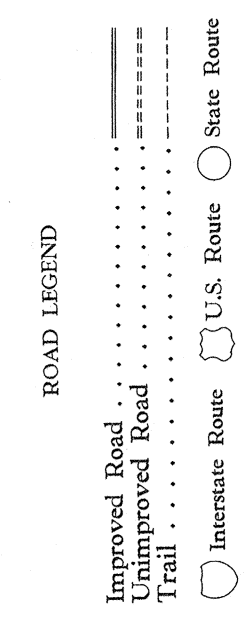
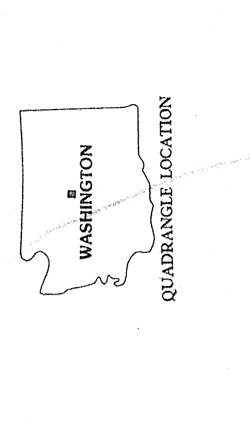
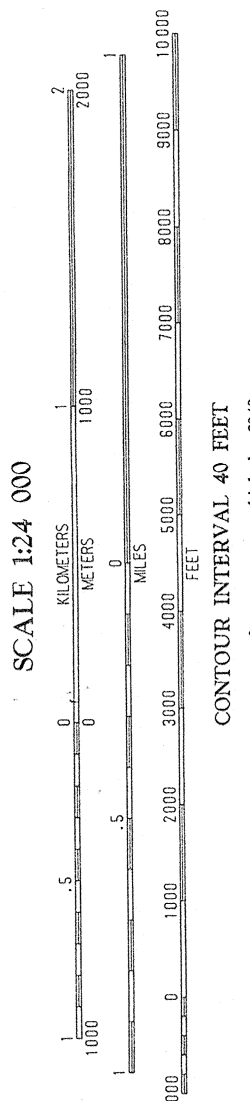
ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route
State Route

1	2	3
1	2	3
4	5	6
7	8	9

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER COLORADO 80225
OR RESTON, VIRGINIA 22092



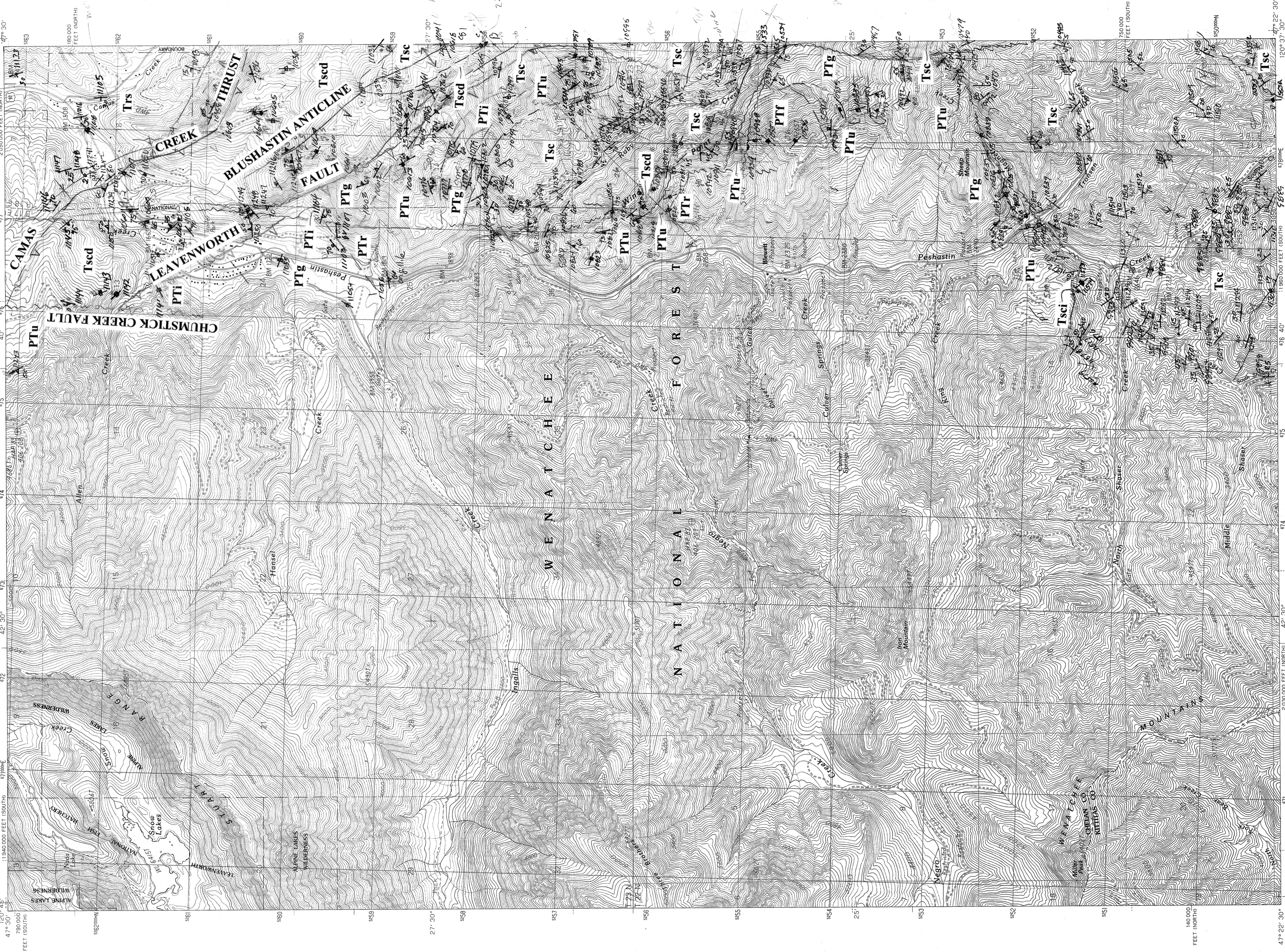
PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN IN 1963
FIELD CHECKED FROM AERIAL PHOTOGRAPHS TAKEN IN 1963
FIELD CHECKED FROM AERIAL PHOTOGRAPHS TAKEN IN 1963
PROJECTION: UTM
GRID: 100-METER STATE GRID TICS
UTM GRID DECLINATION: 11.4 MINUTES
VERTICAL DATUM: 1929 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
elevation values shown by dashed corner ticks
must be reduced by 0.15 meter (6 inches).
There may be private inholdings within the boundaries of any
Federal and State Reservations shown on this map.
No distinction made between houses, barns, and other buildings
Public Land Survey System is shown as published in 1964 and verified
or supplemented in 1967.



PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
field check.

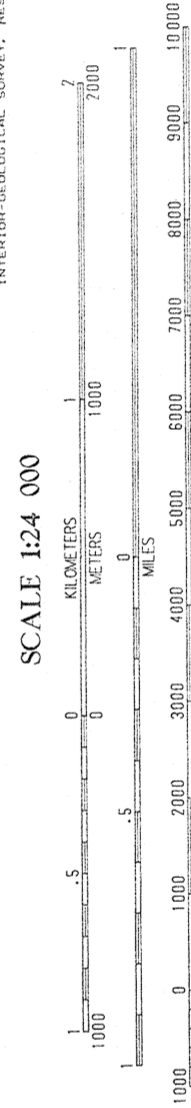
1	2	3	4	5	6	7	8
Peak	Spot	Peak	Spot	Peak	Spot	Peak	Spot
Water	Water	Water	Water	Water	Water	Water	Water
Marsh	Marsh	Marsh	Marsh	Marsh	Marsh	Marsh	Marsh
Swamp	Swamp	Swamp	Swamp	Swamp	Swamp	Swamp	Swamp
Barren	Barren	Barren	Barren	Barren	Barren	Barren	Barren
Barren	Barren	Barren	Barren	Barren	Barren	Barren	Barren
Barren	Barren	Barren	Barren	Barren	Barren	Barren	Barren
Barren	Barren	Barren	Barren	Barren	Barren	Barren	Barren

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225
OR RESTON, VIRGINIA 22092



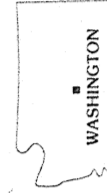
PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY THE NATIONAL GEODETIC SURVEY
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN IN 1961
FIELD CHECKED BY THE GEOLOGICAL SURVEY IN 1961
FIELD CHECKED BY THE GEOLOGICAL SURVEY IN 1961
PROJECTION: LAMBERT CONFORMAL CONIC
GRID: 1983 NAD 83 STATE GRID TICS
WASHINGTON, SOUTH ZONE
UTM GRID DECLINATION: 12° 00' 00" EAST
VERTICAL DATUM: 1927 NORTH AMERICAN DATUM
HORIZONTAL DATUM: 1927 NORTH AMERICAN DATUM
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
121 meters north and 69 meters east
Federal and State Reservations shown on this map
No distinction made between houses, barns, and other buildings
Public Land Survey System is shown as published in 1961 and
verified or supplemented in 1987

PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
field check.



CONTOUR INTERVAL 40 FEET
To convert feet to meters multiply by .3048
To convert meters to feet multiply by 3.2808

FOR SALE BY U.S. GEOLOGICAL SURVEY, DANFORTH COLORADO 80225
OR RISTON, VIRGINIA 22092



QUADRANGLE LOCATION							
1	2	3	4	5	6	7	8

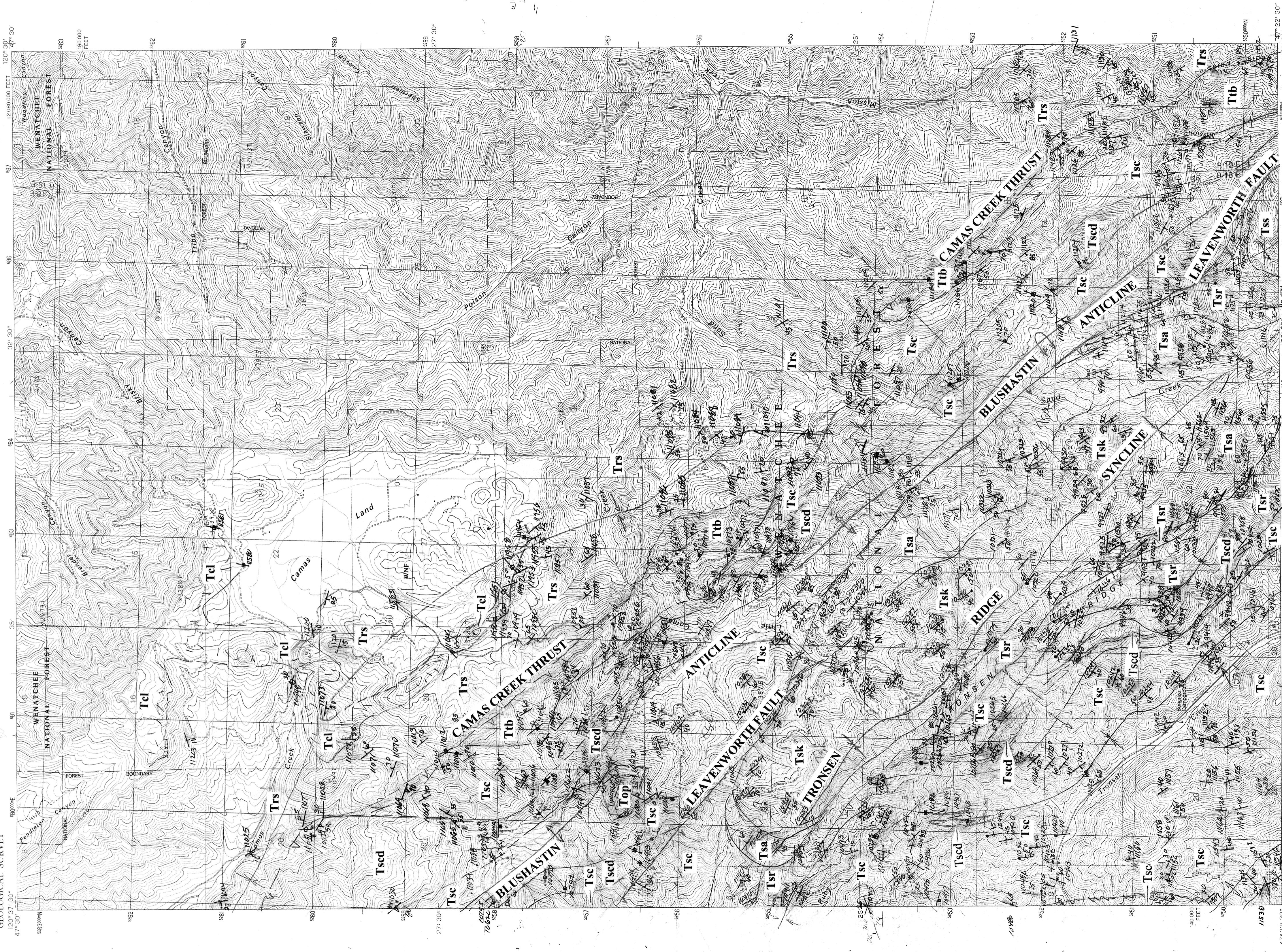
ADJOINING 7.5 QUADRANGLE NAMES

ROAD LEGEND

Improved Road
Unimproved Road
Trail
Interstate Route
U.S. Route
State Route

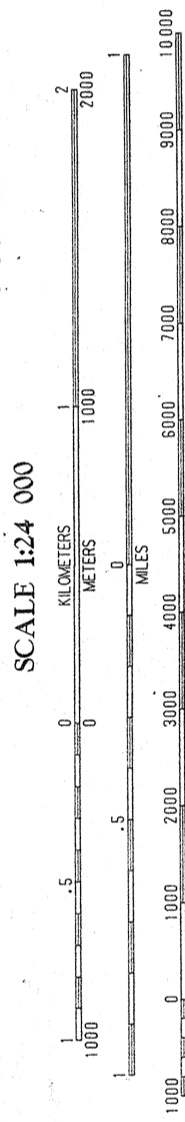
BLEWETT, WASHINGTON
PROVISIONAL EDITION 1989

4712N-D6-TT-024



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY AERIAL PHOTOGRAPHY TAKEN 1961
FIELD CHECKED 1961
LIMITED REVISION 1961
FROM AERIAL PHOTOGRAPHS TAKEN 1961
MAINTAINED 1961
PROJECTION LAMBERT CONFORMAL CONIC
GRID 100-METER UNIVERSAL TRANSVERSE MERCATOR WASHINGTON, NORTH 48° EAST
1983 MAGNETIC NORTH DECLINATION 19° 30' EAST
VERTICAL DATUM 1983
HORIZONTAL DATUM 1983
The predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(23 meters north and 89 meters east)
There may be private inholdings within the boundaries of any
Federal and State Reservations shown on this map
No distinction made between houses, barns, and other buildings
Public Land Survey System is shown as published in 1961 and

PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of
field check.



CONTOUR INTERVAL 40 FEET
To convert feet to meters multiply by .3048
To convert meters to feet multiply by 3.2808

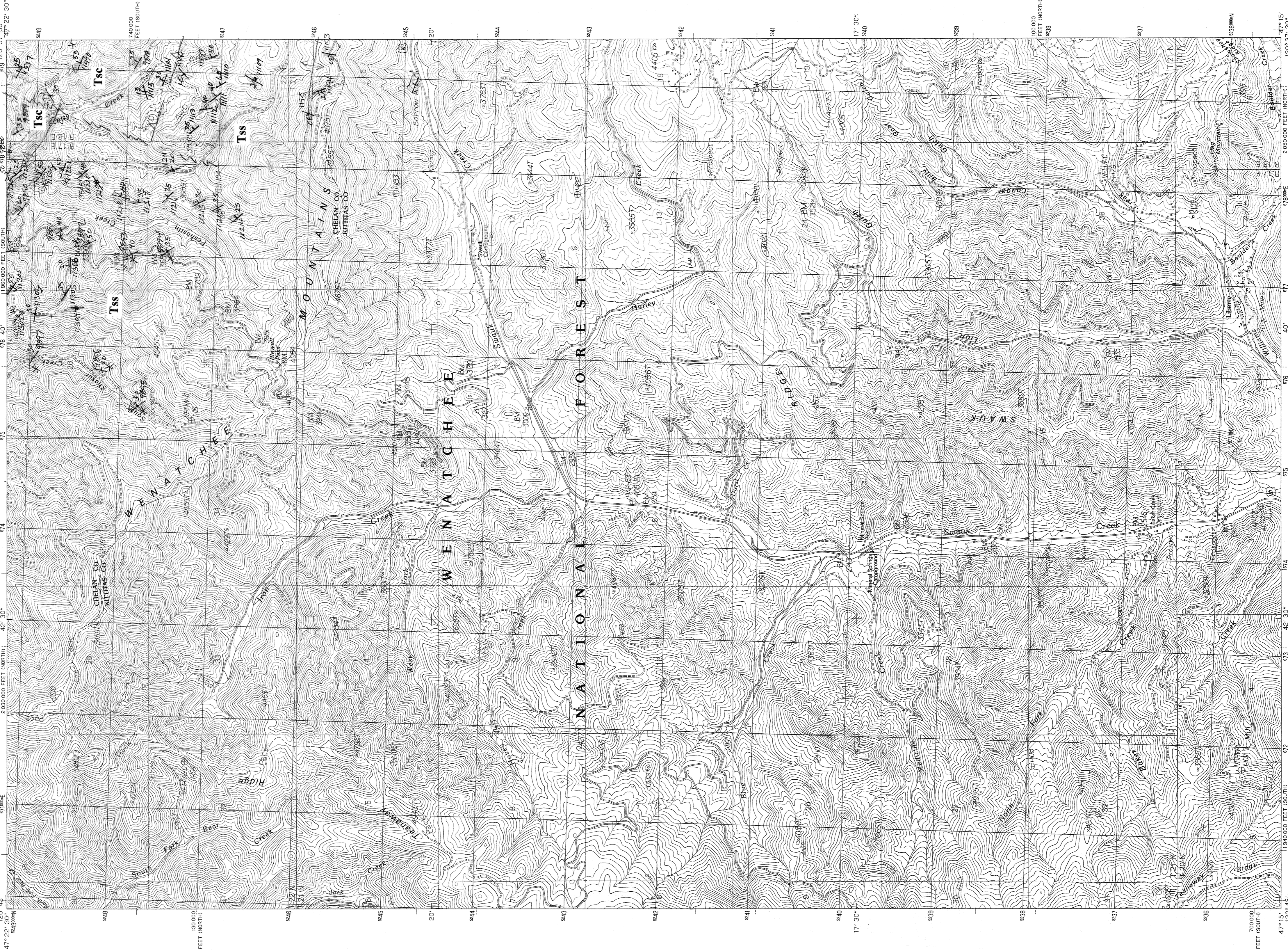
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225
OR RESTON, VIRGINIA 22092

QUADRANGLE LOCATION							
1	2	3	4	5	6	7	8
Leavenworth	Blushastin	Tronsen	Camas Creek	Leavenworth	Blushastin	Tronsen	Camas Creek
1	2	3	4	5	6	7	8
Leavenworth	Blushastin	Tronsen	Camas Creek	Leavenworth	Blushastin	Tronsen	Camas Creek
1	2	3	4	5	6	7	8
Leavenworth	Blushastin	Tronsen	Camas Creek	Leavenworth	Blushastin	Tronsen	Camas Creek

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Instate Route
U.S. Route
State Route
TIPTOP, WASHINGTON
PROVISIONAL EDITION 1989
4710-D5-IT-024

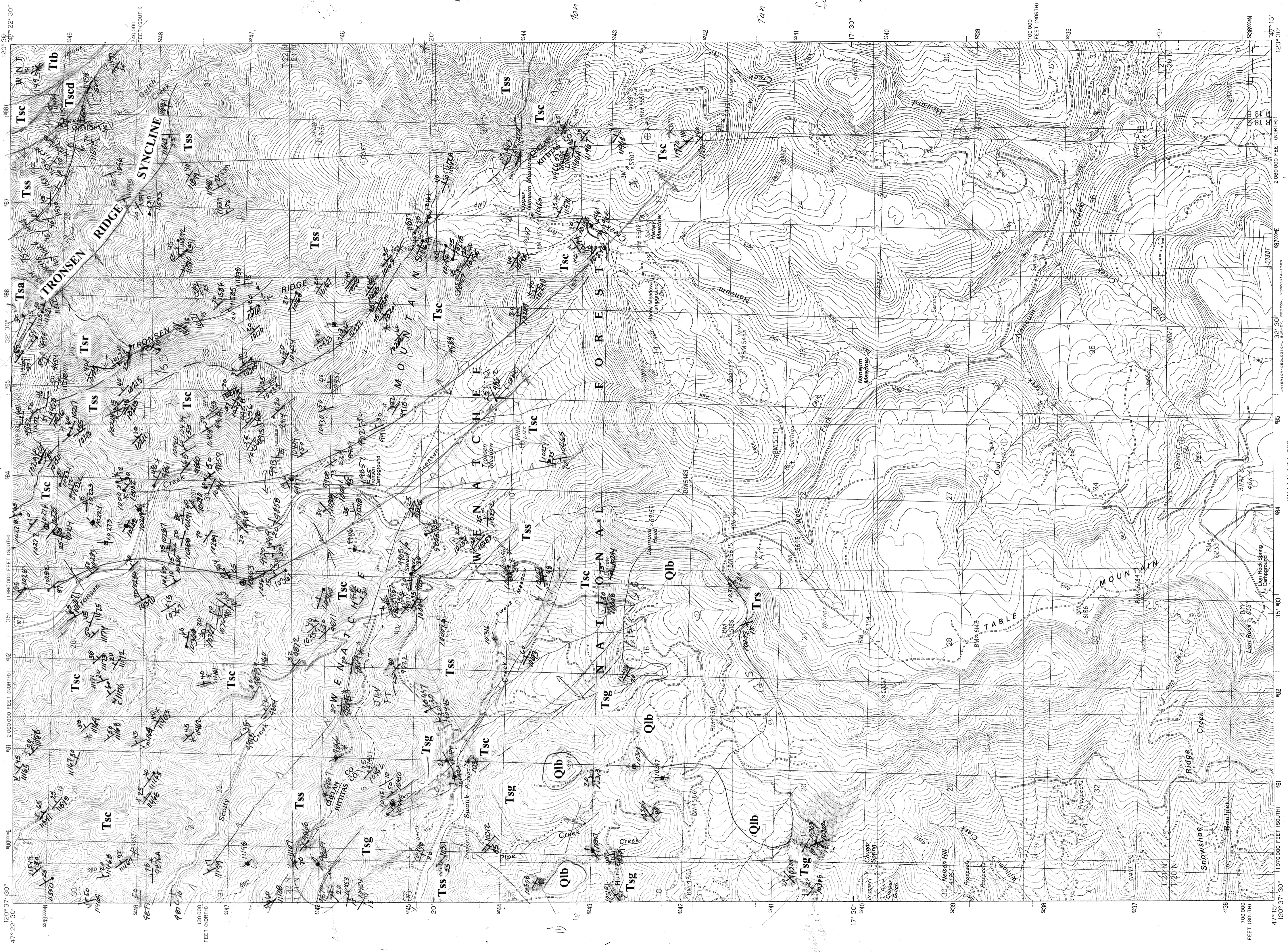
1-
946
basaltic cgl
with calcare ss
942
white wacke
thin bedded
= chert streak

TIPTOP (map 3 of 9) of Geological Society of America Data Repository Item 2009211
(submitted November 2009) to accompany Cheney, E. S., and Hayman, N.W., 2009,
Geological Society America Guidebook 15, p. 19-52.



LIBERTY (map 2 of 9) of Geological Society of America Data Repository Item 2009211
(Submitted November 2009) to accompany Cheney, E. S., and Hayman, N.W., 2009.
Geological Society of America

PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY AERIAL PHOTOGRAPHS TAKEN IN 1958, 1964, 1968, 1972, 1976, 1980, 1984, 1988, 1992, 1996, 2000, 2004, 2008, 2012, 2016, 2020, 2024, 2028, 2032, 2036, 2040, 2044, 2048, 2052, 2056, 2060, 2064, 2068, 2072, 2076, 2080, 2084, 2088, 2092, 2096, 2100, 2104, 2108, 2112, 2116, 2120, 2124, 2128, 2132, 2136, 2140, 2144, 2148, 2152, 2156, 2160, 2164, 2168, 2172, 2176, 2180, 2184, 2188, 2192, 2196, 2200, 2204, 2208, 2212, 2216, 2220, 2224, 2228, 2232, 2236, 2240, 2244, 2248, 2252, 2256, 2260, 2264, 2268, 2272, 2276, 2280, 2284, 2288, 2292, 2296, 2300, 2304, 2308, 2312, 2316, 2320, 2324, 2328, 2332, 2336, 2340, 2344, 2348, 2352, 2356, 2360, 2364, 2368, 2372, 2376, 2380, 2384, 2388, 2392, 2396, 2400, 2404, 2408, 2412, 2416, 2420, 2424, 2428, 2432, 2436, 2440, 2444, 2448, 2452, 2456, 2460, 2464, 2468, 2472, 2476, 2480, 2484, 2488, 2492, 2496, 2500, 2504, 2508, 2512, 2516, 2520, 2524, 2528, 2532, 2536, 2540, 2544, 2548, 2552, 2556, 2560, 2564, 2568, 2572, 2576, 2580, 2584, 2588, 2592, 2596, 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8576, 8580, 8584, 8588, 8592, 8596, 8600, 8604, 8608, 8612, 8616, 8620, 8624, 8628, 8632, 8636, 8640, 8644, 8648, 8652, 8656, 8660, 8664, 8668, 8672, 8676, 8680, 8684, 8688, 8692, 8696, 8700, 8704, 8708, 8712, 8716, 8720, 8724, 8728, 8732, 8736, 8740, 8744, 8748, 8752, 8756, 8760, 8764, 8768, 8772, 8776, 8780, 8784, 8788, 8792, 8796, 8800, 8804, 8808, 8812, 8816, 8820, 8824, 8828, 8832, 8836, 8840, 8844, 8848, 8852, 8856, 8860, 8864, 8868, 8872, 8876, 8880, 8884, 8888, 8892, 8896, 8900, 8904, 8908, 8912, 8916, 8920, 8924, 8928, 8932, 8936, 8940, 8944, 8948, 8952, 8956, 8960, 8964, 8968, 8972, 8976, 8980, 8984, 8988, 8992, 8996, 9000, 9004, 9008, 9012, 9016, 9020, 9024, 9028, 9032, 9036, 9040, 9044, 9048, 9052, 9056, 9060, 9064, 9068, 9072, 9076, 9080, 9084, 9088, 9092, 9096, 9100, 9104, 9108, 9112, 9116, 9120, 9124, 9128, 9132, 9136, 9140, 9144, 9148, 9152, 9156, 9160, 9164, 9168, 9172, 9176, 9180, 9184, 9188, 9192, 9196, 9200, 9204, 9208, 9212, 9216, 9220, 9224, 9228, 9232, 9236, 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PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY USGS NOS/NOAA
FIELD FROM AERIAL PHOTOGRAPHS TAKEN 1967
LIMITED REVISION FROM AERIAL PHOTOGRAPHS TAKEN 1985
FIELD CHECKED 1987 MAP EDITED CANADIAN 1989
GRID UTM UNIVERSAL TRANSVERSE MERCATOR ZONE 10
GRID 1000-METER STATE GRID TICS WASHINGTON SOUTH ZONE
UTM GRID DECLINATION WASHINGTON NORTH ZONE
1983 MAGNETIC NORTH DECLINATION 1973° EAST
VERTICAL DATUM NATIONAL GEODETIC VERTICAL DATUM OF 1959
To place on the predicted North American Datum of 1983,
move the projection lines as shown by dashed corner ticks
(20 meters north and 89 meters east)

PROVISIONAL MAP
Produced from original
manuscript drawings. Infor-
mation shown as of date of

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
To convert feet to meters multiply by .3048
To convert meters to feet multiply by 3.2808

ROAD LEGEND

- Improved Road
- Unimproved Road
- Trail
- Interstate Route
- U.S. Route
- State Route

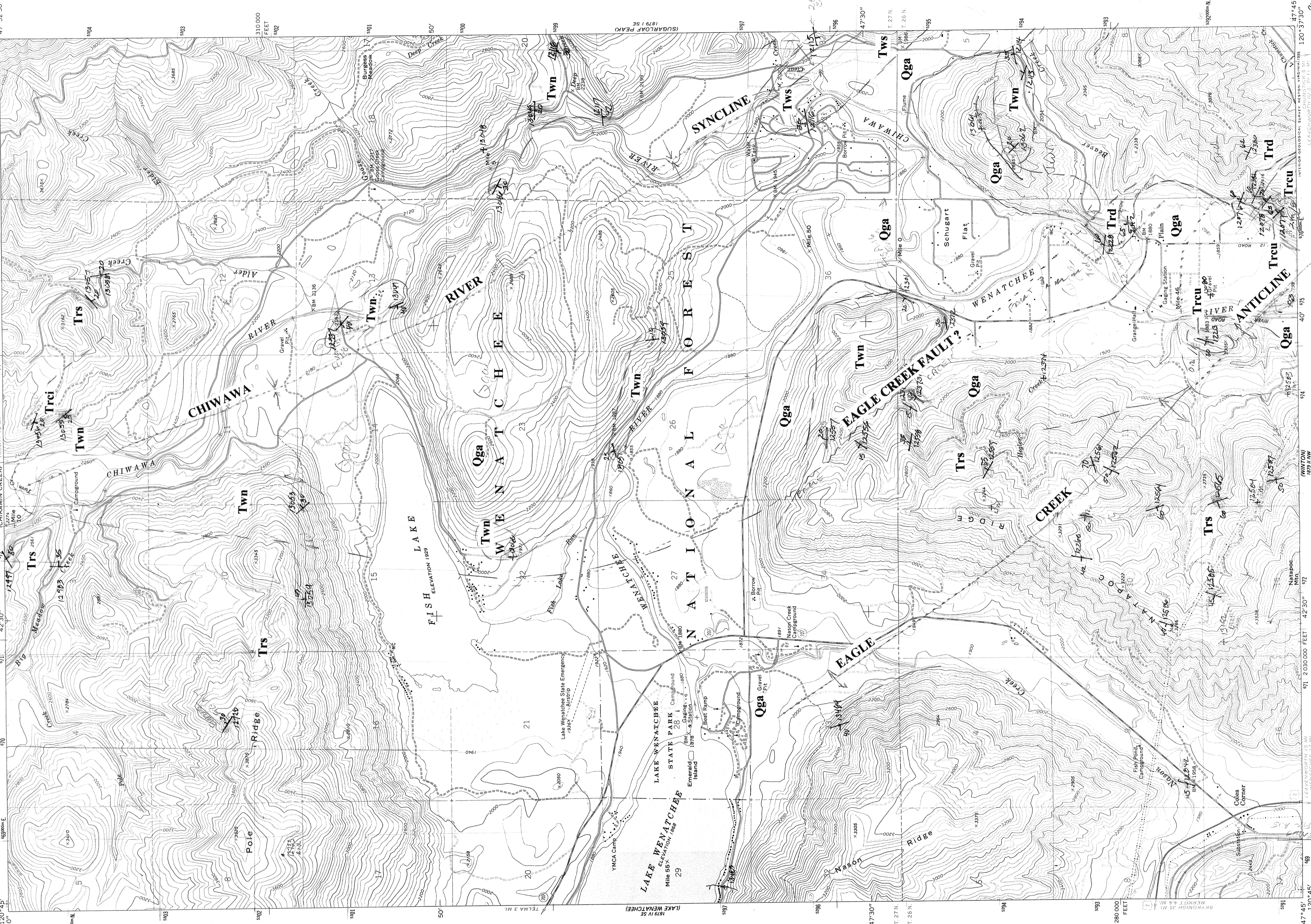
QUADRANGLE LOCATION

WASHINGTON

1 2 3 4 5 6 7 8

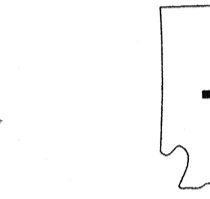
1 Blount
2 Tip-top
3 Monitor
4 Mission Peak
5 House Carro
6 Nason Canyon

2009, Geological Society of America Guidebook 15, p. 19-52.
2009211 (submitted November 2009) to accompany Cheney, E. S., and Hayman, N. W.,
BLEWETT PASS (map 1 of 9) of Geological Society of America Data Repository Item



Produced by the United States Geological Survey
Control by USGS and NOSNOAA
Compiled from aerial photographs taken 1967. Field checked 1968
North American Datum of 1927 (NAD 27). Projection and
1000-foot ticks: Washington Coordinate System, north zone
(Blue 1000-meter Universal Transverse Mercator ticks, zone 10
North American Datum of 1983 (NAD 83) is shown by dashed
corner ticks. The values of the shift between NAD 27 and NAD 83
for 7.5-minute intersections are obtainable from National Geodetic
Survey NADCON software
There may be private inholdings within the boundaries of the
National or State reservations shown on this map
Certain land lines are omitted because of insufficient data

SCALE 1:24,000
0 1000 2000 3000 4000 5000 6000 7000 FEET
0 1 2 3 4 5 6 KILOMETER
CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



ROAD CLASSIFICATION
Primary highway,
hard surface
Secondary highway,
hard surface
Light-duty road, hard or
improved surface
Unimproved road
Interstate Route U. S. Route State Route



PLAIN, WA
47120-56-TF-024
1968

PHOTOREVISED 1987
DMA 1879 1 SW-SERIES 1981

