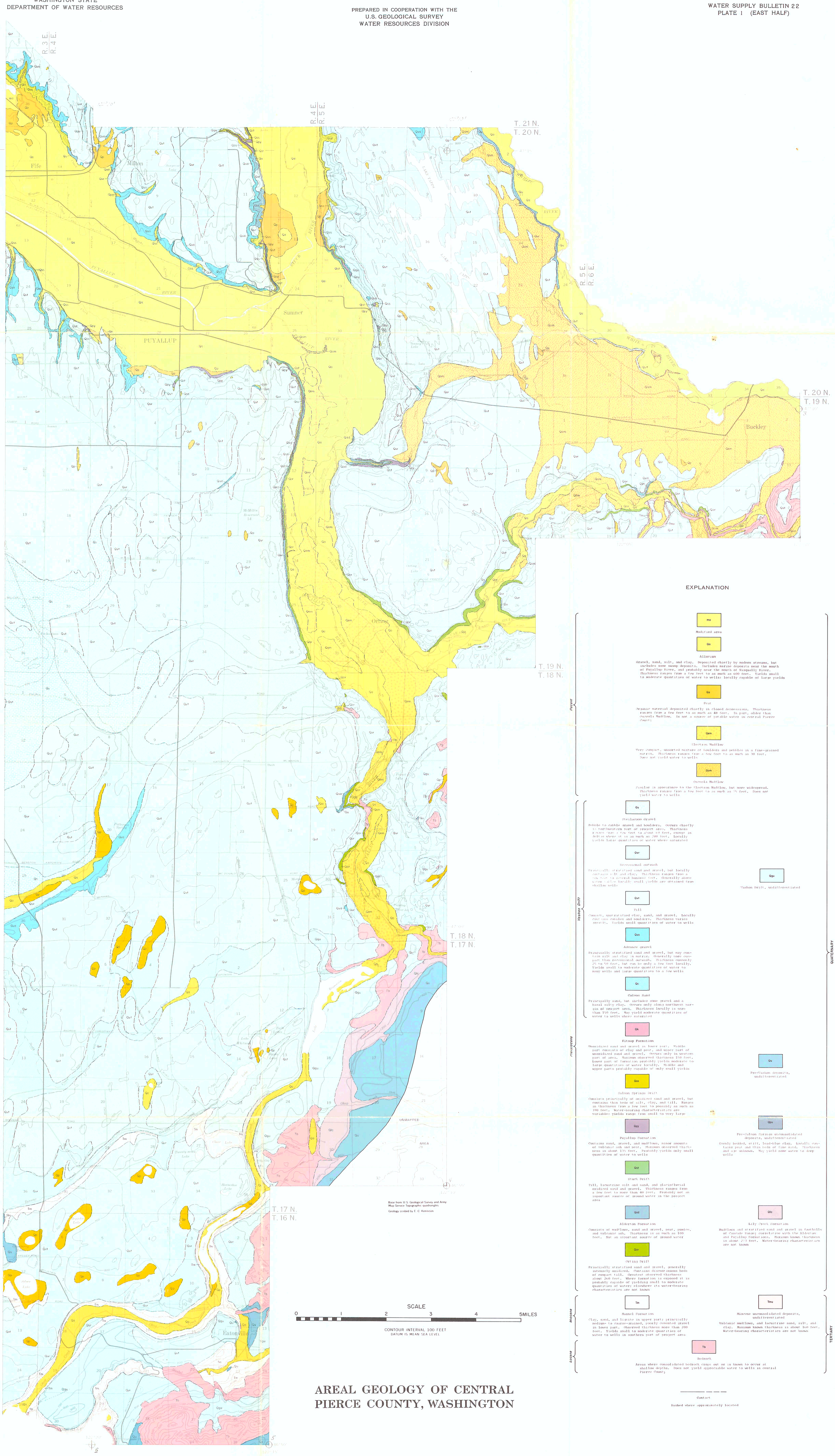
WASHINGTON STATE
DEPARTMENT OF WATER RESOURCES

PREPARED IN COOPERATION WITH THE
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION



Base from U.S. Geological Survey and Army Map Service Topographic quadrangles

Geology scribed by E. C. Kennison

AREAL GEOLOGY OF CENTRAL PIERCE COUNTY, WASHINGTON

EXPLANATION

QUATERNARY

Recent

ma — Modified area

Qa — Alluvium

Gravel, sand, silt, and clay. Deposited chiefly by modern streams, but includes some swamp deposits. Includes marine deposits near the mouth of Puyallup River, and probably near the mouth of Nisqually River. Thickness ranges from a few feet to as much as 600 feet. Yields small to moderate quantities of water to wells; locally capable of large yields

Qp — Peat

Organic material deposited chiefly in closed depressions. Thickness ranges from a few feet to as much as 48 feet. In part, older than Osceola Mudflow. Is not a source of potable water in central Pierce County

Qem — Electron Mudflow

Very compact, unsorted mixture of boulders and pebbles in a fine-grained matrix. Thickness ranges from a few feet to as much as 30 feet. Does not yield water to wells

Qom — Osceola Mudflow

Similar in appearance to the Electron Mudflow, but more widespread. Thickness ranges from a few feet to as much as 75 feet. Does not yield water to wells

Vashon Drift

Qs — Steilacoom Gravel

Pebble to cobble gravel and boulders. Occurs chiefly in northwestern part of project area. Thickness ranges from a few feet to about 40 feet, except in belt where it is as much as 200 feet. Locally yields large quantities of water where saturated

Qvr — Recessional outwash

Principally stratified sand and gravel, but locally contains silt and clay. Thickness ranges from a few feet to several hundred feet. Generally above water table; locally small yields are obtained from shallow wells

Qvt — Till

Compact, unstratified clay, sand, and gravel. Locally contains cobbles and boulders. Thickness varies greatly. Yields small quantities of water to wells

Qva — Advance gravel

Principally stratified sand and gravel, but may contain silt and clay in matrix. Generally more compact than recessional outwash. Thickness commonly 25 to 50 feet, but can be only a few feet locally. Yields small to moderate quantities of water to many wells and large quantities to a few wells

Qc — Colvos Sand

Principally sand, but includes some gravel and a basal silty clay. Occurs only along northeast margin of project area. Thickness locally is more than 150 feet. May yield moderate quantities of water to wells where saturated

Qgu — Vashon Drift, undifferentiated

Pleistocene

Qk — Kitsap Formation

Unoxidized sand and gravel in lower part. Middle part consists of clay and peat, and upper part of unoxidized sand and gravel. Occurs only in western part of area. Maximum observed thickness 150 feet. Lower part of formation probably yields moderate to large quantities of water locally. Middle and upper parts probably capable of only small yields

Qu — Pre-Vashon deposits, undifferentiated

Qss — Salmon Springs Drift

Consists principally of oxidized sand and gravel, but contains thin beds of silt, clay, and till. Ranges in thickness from a few feet to possibly as much as 390 feet. Water-bearing characteristics are variable; yields range from small to very large

Qpy — Puyallup Formation

Contains sand, gravel, and mudflows, minor amounts of volcanic ash and peat. Maximum observed thickness in about 135 feet. Probably yields only small quantities of water to wells

Qpu — Pre-Salmon Springs unconsolidated deposits, undifferentiated

Evenly bedded, stiff, lead-blue clay. Locally contains peat and thin beds of fine sand. Thickness and age unknown. May yield some water to deep wells

Qst — Stuck Drift

Till, lacustrine silt and sand, and glaciofluvial oxidized sand and gravel. Thickness ranges from a few feet to more than 40 feet. Probably not an important source of ground water in the project area

Qod — Alderton Formation

Consists of mudflows, sand and gravel, peat, pumice, and volcanic ash. Thickness is as much as 100 feet. Not an important source of ground water

Qlc — Lily Creek Formation

Mudflows and stratified sand and gravel in foothills of Cascade Range; correlative with the Alderton and Puyallup Formations. Maximum known thickness is about 233 feet. Water-bearing characteristics are not known

Qor — Orting Drift

Principally stratified sand and gravel, generally intensely oxidized. Contains discontinuous beds of compact till. Greatest observed thickness about 260 feet. Where formation is exposed it is probably capable of yielding small to moderate quantities of water; elsewhere its water-bearing characteristics are not known

TERTIARY

Miocene

Tm — Mashel Formation

Clay, sand, and lignite in upper part; principally medium- to coarse-grained, poorly cemented gravel in lower part. Observed thickness more than 200 feet. Yields small to moderate quantities of water to wells in southern part of project area

Tmu — Miocene unconsolidated deposits, undifferentiated

Volcanic mudflows, and lacustrine sand, silt, and clay. Maximum known thickness is about 160 feet. Water-bearing characteristics are not known

Eocene

Tb — Bedrock

Areas where consolidated bedrock crops out or is known to occur at shallow depths. Does not yield appreciable water to wells in central Pierce County

Contact

Dashed where approximately located

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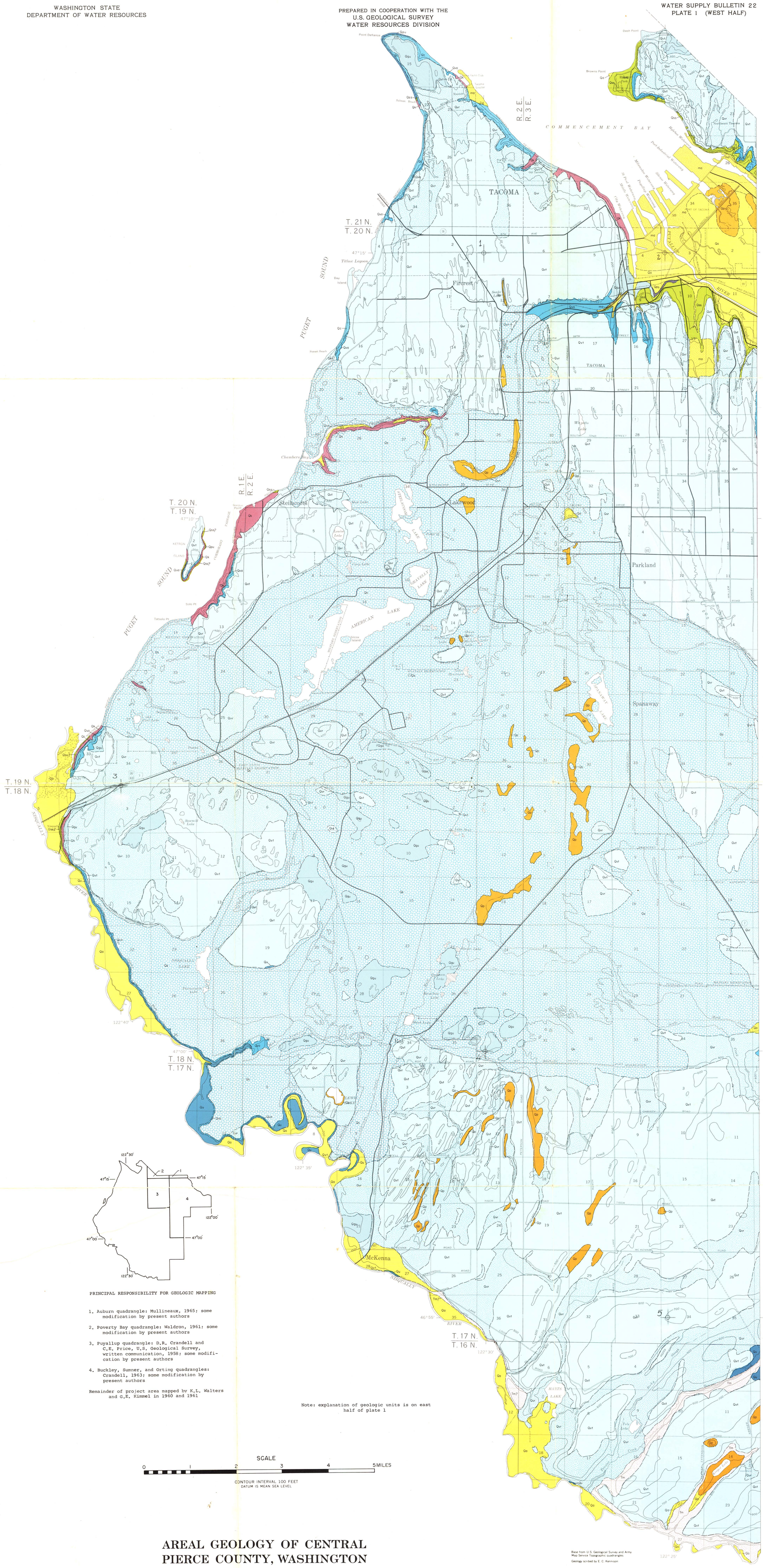
WATER SUPPLY BULLETIN 22
PLATE 1 (WEST HALF)



PRINCIPAL RESPONSIBILITY FOR GEOLOGIC MAPPING

1. Auburn quadrangle: Mullineaux, 1965; some modification by present authors
2. Poverty Bay quadrangle: Waldron, 1961; some modification by present authors
3. Puyallup quadrangle: D.R. Crandell and C.E. Price, U.S. Geological Survey, written communication, 1958; some modification by present authors
4. Buckley, Sumner, and Orting quadrangles: Crandell, 1963; some modification by present authors

Remainder of project area mapped by K.L. Walters and G.E. Kimmel in 1960 and 1961

Note: explanation of geologic units is on east half of plate 1

SCALE
0 1 2 3 4 5 MILES

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

Base from U.S. Geological Survey and Army Map Service Topographic quadrangles
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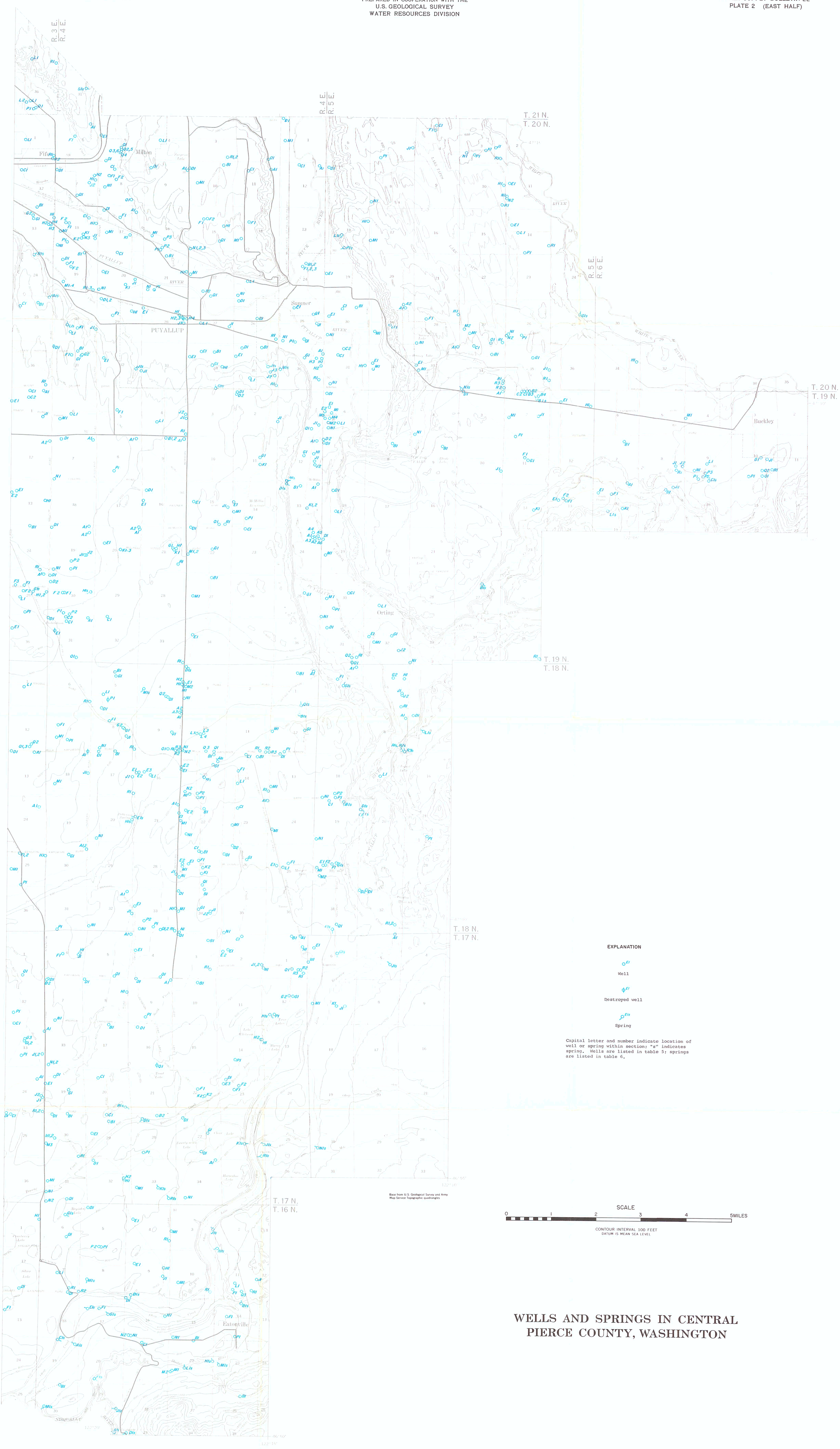
WATER SUPPLY BULLETIN 22
PLATE 2 (EAST HALF)



EXPLANATION

Well

Destroyed well

Spring

Capital letter and number indicate location of well or spring within section; "s" indicates spring. Wells are listed in table 5; springs are listed in table 6.

SCALE

0 1 2 3 4 5 MILES

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

WELLS AND SPRINGS IN CENTRAL PIERCE COUNTY, WASHINGTON

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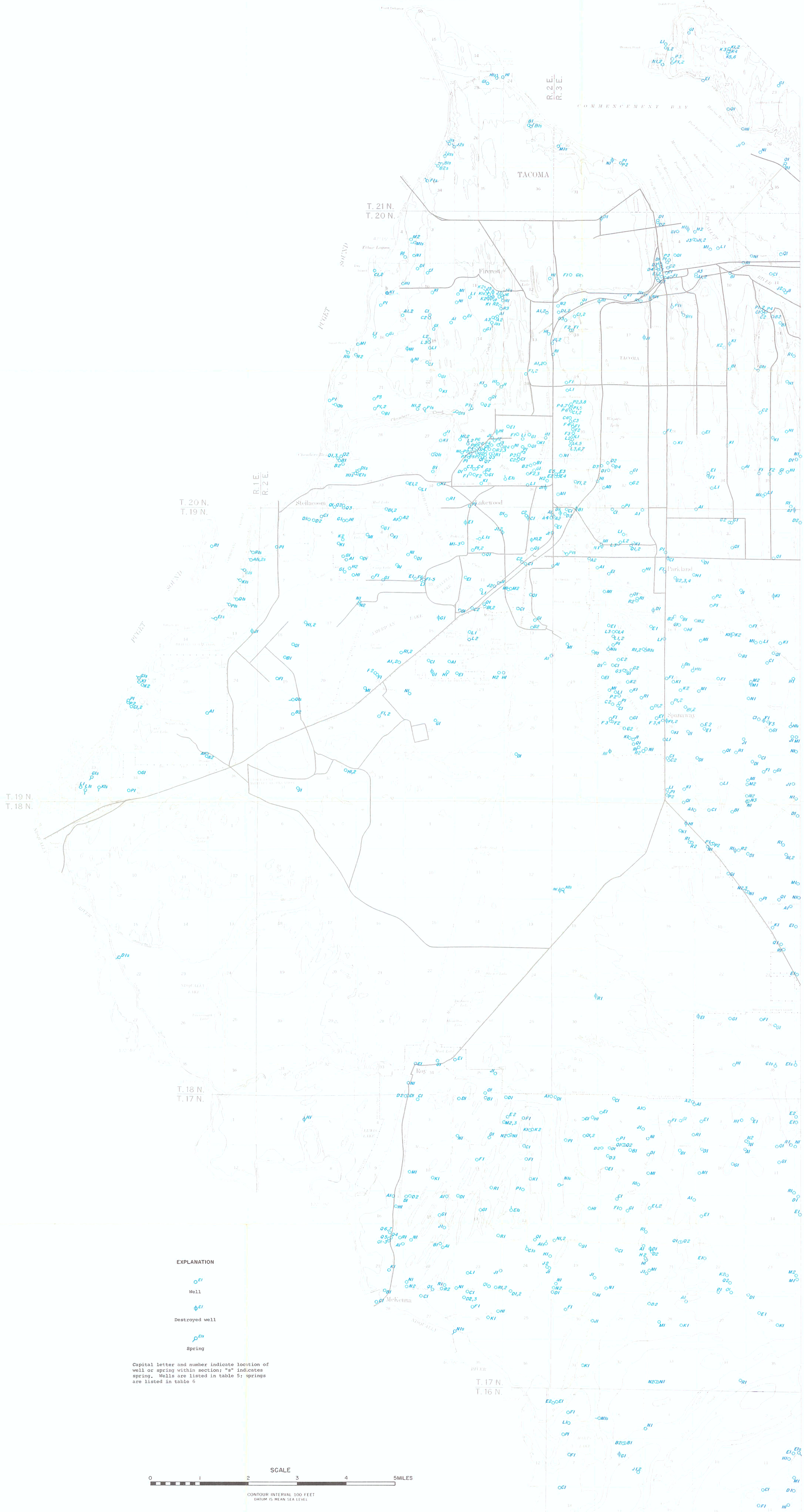
WATER SUPPLY BULLETIN 22
PLATE 2 (WEST HALF)



EXPLANATION

Well

Destroyed well

Spring

Capital letter and number indicate location of well or spring within section; "s" indicates spring. Wells are listed in table 5; springs are listed in table 6

SCALE

0 1 2 3 4 5 MILES

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

WELLS AND SPRINGS IN CENTRAL PIERCE COUNTY, WASHINGTON

Base from U.S. Geological Survey and Army Map Service Topographic quadrangles

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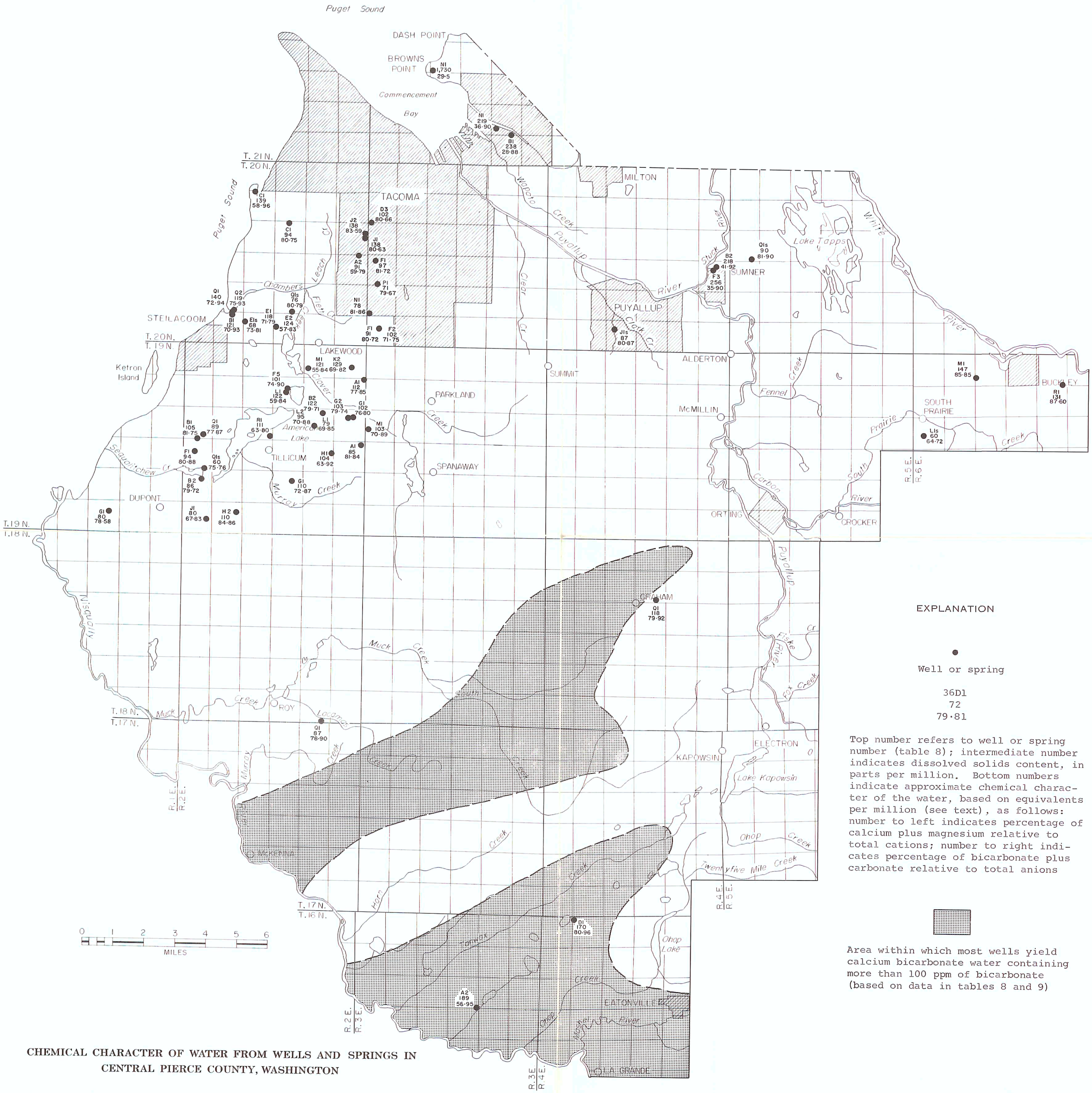

EXPLANATION

● Well or spring

36D1
72
79·81

Top number refers to well or spring number (table 8); intermediate number indicates dissolved solids content, in parts per million. Bottom numbers indicate approximate chemical character of the water, based on equivalents per million (see text), as follows: number to left indicates percentage of calcium plus magnesium relative to total cations; number to right indicates percentage of bicarbonate plus carbonate relative to total anions

Area within which most wells yield calcium bicarbonate water containing more than 100 ppm of bicarbonate (based on data in tables 8 and 9)

CHEMICAL CHARACTER OF WATER FROM WELLS AND SPRINGS IN CENTRAL PIERCE COUNTY, WASHINGTON