STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

Brian Boyle, Commissioner of Public Lands

Art Stearns, Supervisor

DIVISION OF GEOLOGY AND EARTH RESOURCES
Raymond Lasmanis, State Geologist

GEOPHYSICAL MAP GM-27

**COMPLETE BOUGUER GRAVITY ANOMALY MAP,
CASCADE MOUNTAINS, WASHINGTON**

By
Z.F. DANEŠ AND W.M. PHILLIPS

Prepared in cooperation with
U.S. Department of Energy
Contract DE-AC03-79ET27014

1983

For sale by the Department of Natural Resources

Price \$ 3.25

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Topographic base map from portions of the Cassin, Seattle, Victoria, and Wenatchee 1:250,000 USGS map series

LEGEND

Estimated maximum uncertainty of gravity measurements 5 mgals
Theoretical gravity IGF (1967)
Bouguer reduction density 2.67 g/cc

Potdam correction: Gravity base stations adjusted by -13.00 mgals relative to old international gravity base station at Potdam.

Terrain corrections: Near terrain corrections (Hammer Zone A-D) determined via use of graphs based on geometry of topography in immediate vicinity of observation points. Distant terrain corrections calculated using the analytical method of Danes (1983).

Principal gravity facts and discussion of terrain corrections available in Danes and Phillips (1983).

Note: The companion map to this work, Complete Bouguer Gravity Anomaly Map, Southern Cascade Mountains, Washington (sheet 2), uses a terrain correction method (Plouff, 1977) that differs from the one employed here. Therefore, contour lines on the two maps are not continuous across the 47°N latitude boundary.

SOURCE OF GRAVITY DATA

Aiken (1970), Campbell and Johnson (1982), Lepp (1978), Stuart (1965), all other data collected by Z. F. Danes. Gravity data tied into the Washington gravity base station network (Nilsen, 1976).

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Gravity contour interval 5 mgals
Gravity contours dashed where uncertain
Hachured contour indicates low gravity
Location of gravity stations shown by dots

REFERENCES CITED

- Aiken, C. L., 1970, Gravimetric profiles across northern Cascades employing minimum assumptions as to subsurface density distribution: University of Washington M.S. thesis, 134 p.
- Campbell, D. S.; Johnson, D. J., 1982, Bouguer gravity study of Mount Rainier/Pinnacle Peak, Washington: Northwest Science, v. 56, no. 2, p. 90-100.
- Danes, Z. F., 1982, An analytic method for the determination of distant terrain corrections: Geophysics, v. 47, no. 10, p. 1453-1455.
- Danes, Z. F.; Phillips, W. M., 1983, Principal facts and a discussion of terrain correction methods for the complete Bouguer gravity anomaly map of the Cascade Mountains, Washington: Washington Division of Geology and Earth Resources Open-File Report 83-1, 15 p., 1:45 gravity data sheets.
- Lepp, L. R., 1978, Geophysical investigation of southeastern Puget Sound lowland, Washington, USA: University of Puget Sound B.S. thesis, 11 p., 1:45 gravity data sheets.

Nilsen, Tor, 1976, Washington gravity base station network: Washington Division of Geology and Earth Resources Information Circular 59, 83 p.

Plouff, D., 1977, Preliminary documentation for a FORTRAN program to compute gravity terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77-335, 45 p.

Stuart, D. J., 1965, Gravity data and Bouguer gravity map for western Washington: U.S. Geological Survey Open-File Report, 7 p., 46 gravity sheets, 1 map, 1:45 gravity data sheets.

ACKNOWLEDGMENTS

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M. E. Comfort, J. Dobb, D. B. Palmer, and B. H. Vaughn assisted with collection of gravity data and preparation of the map. Special thanks to the University of Puget Sound students, colleagues, and friends who assisted with field and office work.

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REFERENCES CITED

- Danes, Z. F., Phillips, W. M., 1983, Principal facts and a discussion of terrain correction methods for the complete Bouguer gravity anomaly map of the Cascade Mountains, Washington: Washington Division of Geology and Earth Resources Open-File Report 83-1, 15 p., 145 gravity data sheets.
- Danes, Z. F., 1982, An analytic method for the determination of distant terrain corrections: Geophysics, v. 47, no. 10, p. 1453-1455.
- Goman, T., 1967, Gravity survey of Mount St. Helens, Washington: University of Puget Sound Undergraduate Research Project.
- Konček, D. L., 1974, Geophysical survey in south-central Washington: University of Puget Sound M.S. thesis, 35 p.
- Konček, D. L., 1975, Geophysical survey in south-central Washington: Northwest Science, v. 49, no. 2, p. 106-117.
- Nilsen, Tor, 1976, Washington gravity base station network: Washington Division of Geology and Earth Resources Information Circular 59, 83 p.
- Plouff, D., 1977, Preliminary documentation for a FORTRAN program to compute gravity terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77-535, 45 p.
- Rowley, S. H., 1982, A geophysical investigation of Mt. Adams, Washington [abstract]: Eos, v. 63, no. 8, p. 174.
- Stricklin, C. R., 1975, Geophysical survey of the Lemel Rock-Streamboat Mountain area, Washington: University of Puget Sound M.S. thesis, 23 p.
- Stuart, D.J., 1965, Gravity data and Bouguer gravity map for western Washington: U.S. Geological Survey Open-File Report, 7 p., 46 gravity sheets, 1 map.

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MAP LOCATION

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