NOTICE CONCERNING COPYRIGHT RESTRICTIONS

STATE OF IDAHO, STATE COUPLED

GEOTHERMAL EXPLORATORY EFFORTS ON THE NAMPA-CALDWELL AREA 1979

John Anderson

Idaho Department of Water Resources

The Idaho Department of Water Resources has cooperated with the Department of Energy for the past three years to collect basic data describing the geothermal resources of the state. The major part of this effort has been to update the inventory of known hydrothermal occurrences and assess their potential for direct contact use. The inventory information formed the data base for the Geothermal Resources Map of Idaho which is being printed by the National Oceanic and Atmospheric Administration.

Several earlier state publications resulting from Department of Energy funded research were regional geothermal assessments with hydrothermal inventories. Part of last year's efforts were local geology and geothermal assessments for the Nampa-Caldwell and Tyhee-Pocatello areas.

The Nampa-Caldwell area lies within the western Snake River Plain where warm waters have been encountered by some irrigation wells and by all deep wells drilled for oil and gas explorations.

"A study was initiated by D.O.E.," to map the surficial geologic units and to obtain and review all available subsurface data to obtain information on subsurface aquifers and structures likely to yield hot water for industrial, municipal, and residential use.

Briefly, the western Snake River Plain is a deep graben filled with volcanic and sedimentary rocks of Cenozoic age. Total thickness of the basin fill is known to exceed 4.1 Km. from the deep exploratory well near Meridian, Idaho. Granitic rocks are exposed along the northeast and the southeast margin of the plain. The granitic rocks in the Owyhee Mountains and along the northeast margin of the plain are covered by a veneer of volcanic and sedimentary rocks of late Cenozoic age. The late Cenozoic rocks along the margin of the plain are down tilted and down faulted toward the plain. Because of the structure, some of the exposed volcanic and sedimentary rocks at the margin are correlative with subsurface units in the plain beneath Nampa and Caldwell.

Information gathered to date is due to an integrated geological, geophysical and heat flow studies being done by the Idaho Department of Water Resources to exemplify the suspected resource within the study area. Idaho Department of Water Resources contracted for a gravity study of the area by Roger Olson, (M.S. thesis, Brigham Young University, in prep). Gravity was measured at 680 stations with a Worden Geodesist gravimeter in an area of 182 square miles. A terrain-corrected Bouguer anomaly map was produced which shows: (1) a strong (15-20 mgal) northwest trending gravity

high; (2) linear anomalies trending north-south and east-west and (3) high spatial frequency anomalies with complex orientation. The northwest trending gravity high is a regional anomaly probably caused by a thick accumulation of volcanic material in a fault-bounded or down-warped structural trough. A third-order polynomial residual map was chosen to emphasize local, near surface anomalies and depress the regional anomaly. The residual linear trending anomalies were interpreted as buried faults but could result from a buried low density erosional remnant. High frequency anomalies in the study area probably represent structural complexities in near surface basalt flows. Two and one-half dimensional modeling shows general magnitudes and possible configurations of anomalous bodies, but it is not possible to deduce specific geologic structures from gravity data alone.

Geophysical data in the form of siesmic reflective (vibraseised) and magneto telluric surveys has been acquired for the Nampa-Caldwell area and is being interpreted.

A heat flow study of the area was contracted through Roger Smith, (M.S. thesis, Washington State University, in prep). Temperature gradients of 150 wells were measured and thermal conductivity of 250 samples were used. Interpretation of these results included a heat flow contour map outlining several zones of anomalously high values.

Surface and subsurface geology and hydrology is being interpreted and mapped by John Anderson (IDWR) and Spence Wood (Boise State University). Numerous water-well driller's logs were used to delineate near-surface basalts, and obtain information on the stratigraphy of the uppermost layers (upper 500 feet). From the deep oil and gas wells that have been drilled in the area, interpretations on deeper structures have been made and evidence has been found showing that deeper, warmer aquifers do exist. These should be investigated further for their potential use.

The Nampa-Caldwell area has, from the data interpreted to date, a high potential of having a widespread low-temp (30^{o}-50^{o}) untapped resource at depths exceeding 330 meters except where the resource finds it way to a shallower area through faulted zones.

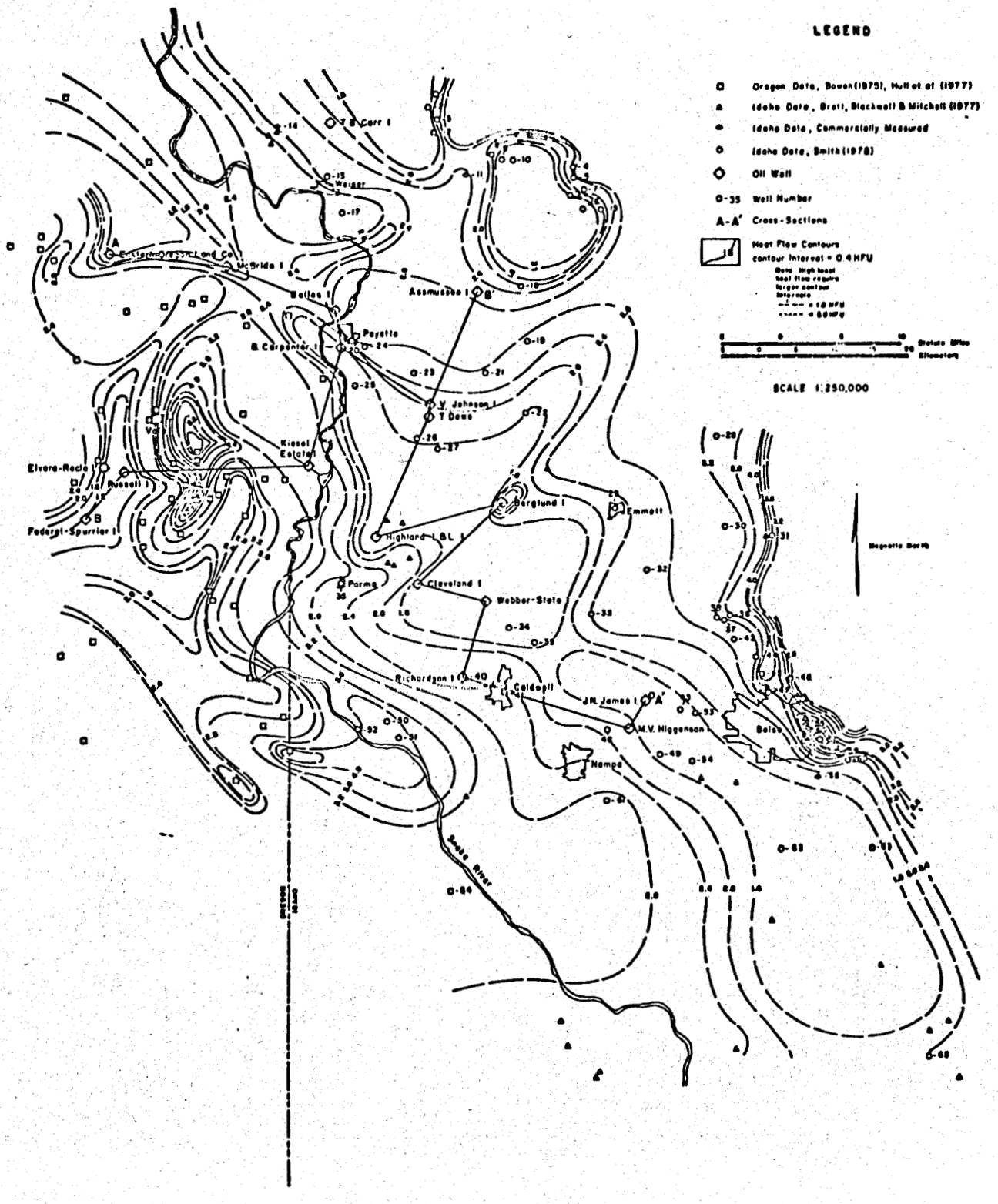
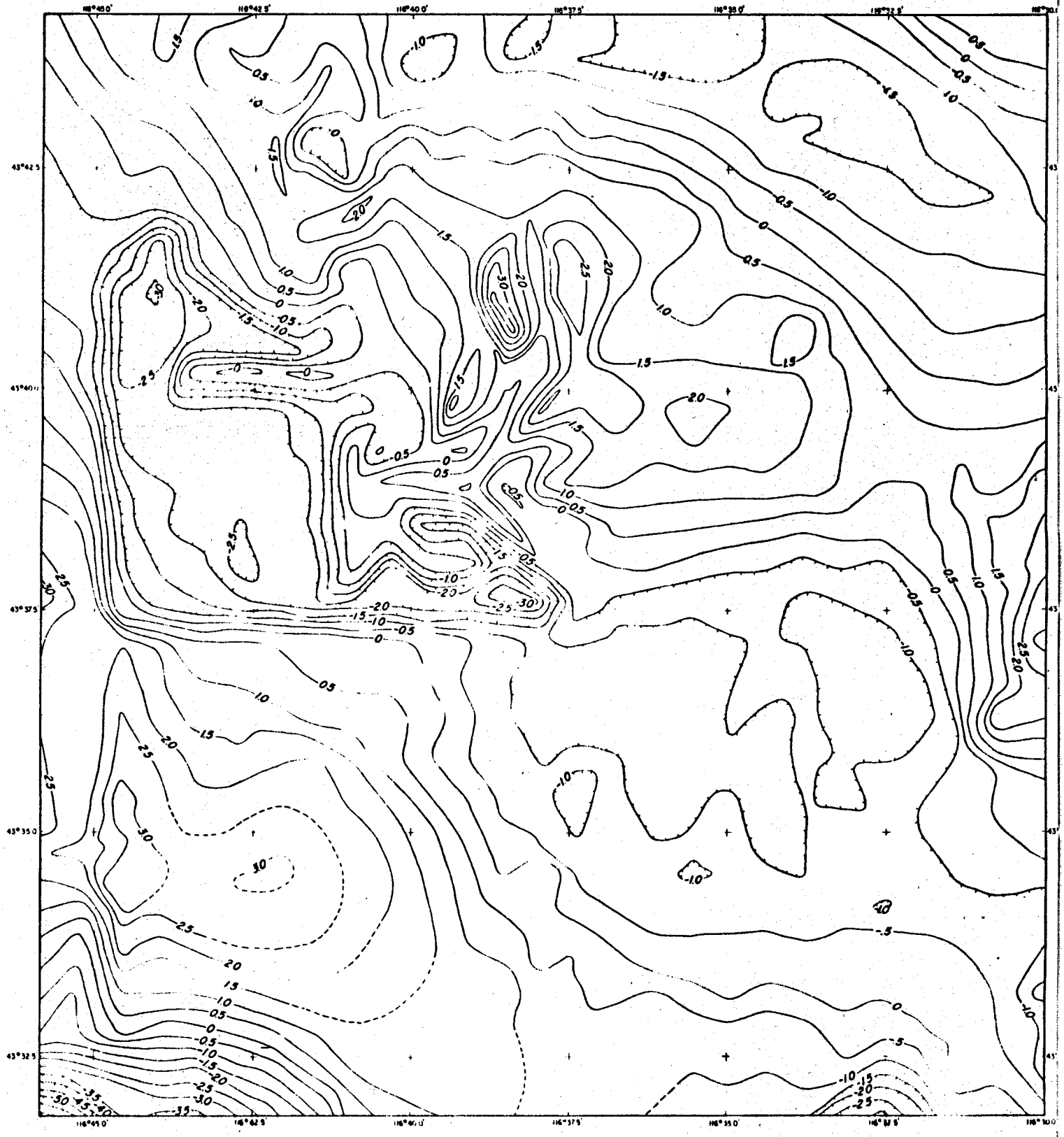


Figure 4. Heat flow contour map of the western Snake River Plain

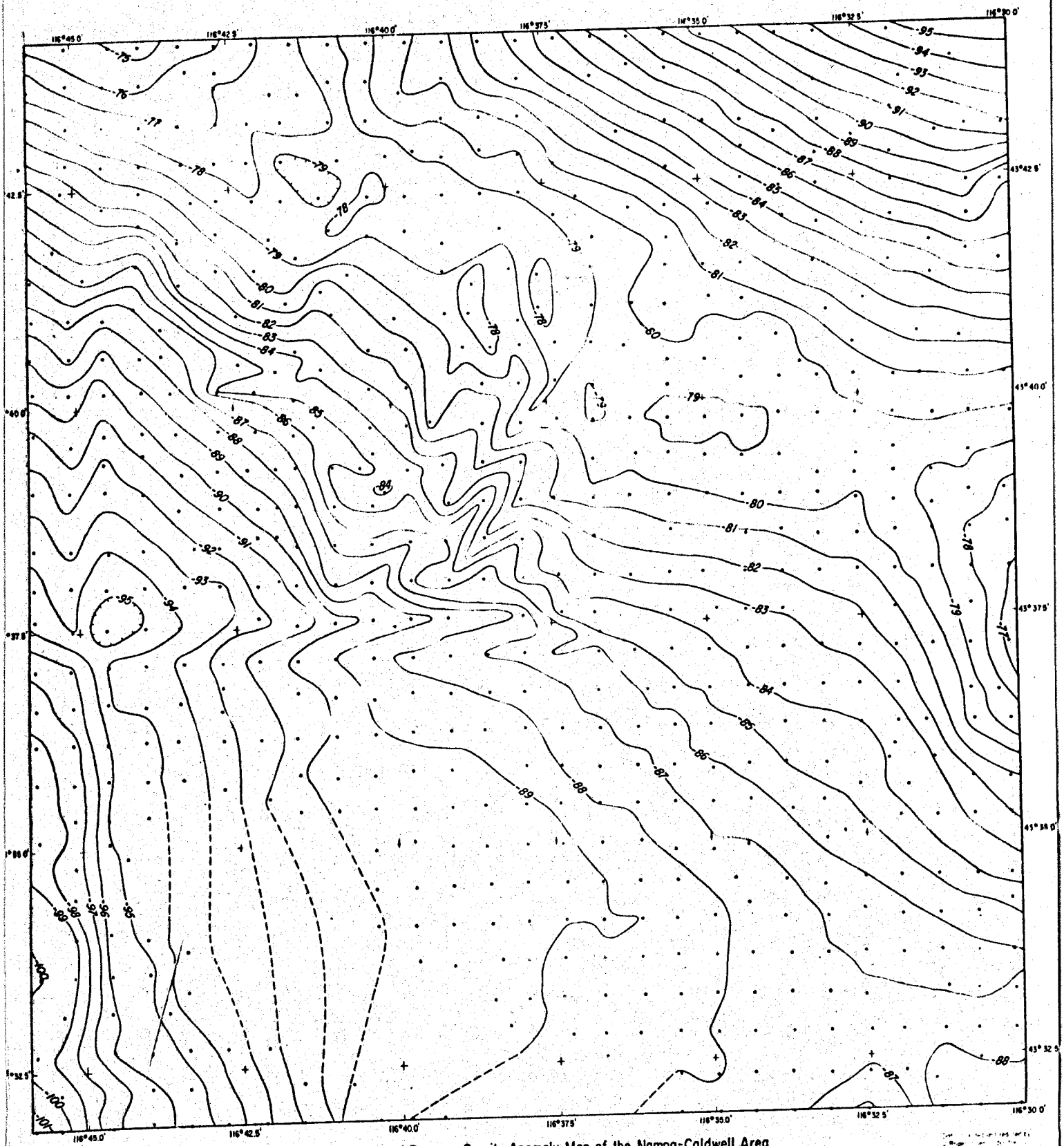


Third-order Polynomial Residual Gravity Anomaly Map of the Nampa-Caldwell Area, Canyon County, Idaho

1979

by

J. Roger Olsen



Terrain-Corrected Bouguer Gravity Anomaly Map of the Nampa-Caldwell Area
Canyon County, Idaho
1979

by
J. Roger Olsen