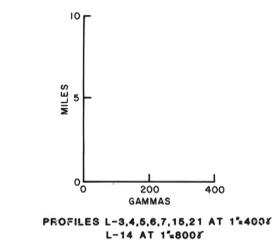


**AREA A  
(NUKA RIDGE)**

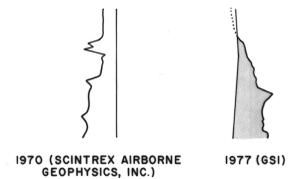
SCALE 1:63,360  
0 2 MI  
0 3 KM



This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.



**AEROMAGNETIC SURVEY**



This Open-File Report combines two sets of aeromagnetic profiles (Geophysical Services, Inc., 1978, and U.S. Geological Survey, 1972) with a 1:250,000-scale generalization of surface geology (Mayfield and others, 1978) of the Brooks Range and foothills in the southern National Petroleum Reserve in Alaska (NPPRA). An aeromagnetic map (U.S. Geological Survey, 1972) and geologic map (Tailleur and others, 1966; Mayfield and others, in prep.) of the Nuka Ridge area are included at a larger scale. This display of previously released information permits direct comparisons of magnetic responses to known surface exposures in stratigraphically and structurally complex regions.

Although the aeromagnetic data differ, they complement one another. The latitudinal profiles and the detailed survey were contracted from Scintrex Airborne Geophysics, Inc., by the U.S. Navy and the Geological Survey in 1970. The 3881 km (2,100 miles) of profiles, flown at approximately 305 m (1,000 feet) above local terrain using a Scintrex ASQ-10 fluxgate magnetometer, completed the aeromagnetic coverage of NPPRA (Woolson and others, 1962). The detailed survey attempted to determine whether igneous rock layers surrounding Nuka Ridge, herein designated Area A, persisted under that allochthon (Tailleur and others, 1966). These data were originally released as nested profiles with accompanying location map at 1:250,000 scale and a magnetic map of the Nuka Ridge area at 1:63,360 scale (U.S. Geological Survey, 1972) and were later incorporated into an aeromagnetic map released at a 1:1,000,000 scale (Decker, 1977). The nested profiles and two east-west tie lines were originally plotted on an arbitrary datum without removing the regional field. In this compilation, the profiles were inverted so that the positive anomalies are on the right or eastward side of the flight line. The profiles were reduced from their original 1 inch = 100 gamma scale to 1 inch = 200 gamma scale. In addition, the line-patterned high-amplitude anomalies represent reduction to 1 inch = 400 gamma scale, and the hatched pattern anomaly of line 14 indicates reduction to 1 inch = 800 gammas.

The skewed profiles were contracted from Geophysical Services, Inc., by Husky Oil NPR Operations, Inc., to provide additional data along seismic lines planned for the Geological Survey's 1978 exploration program. These 1932 km (1,200 miles) of line data were obtained in 1977 with a Geometrics G-803 proton precession magnetometer towed from a Bell 212 helicopter flying 244 m (800 feet) above ground. The absolute data were compiled by a digital computer which removed the IGRF regional field and then plotted the flight lines and profiles (Geophysical Services, Inc., 1978). On these profiles, the location of a specific aeromagnetic value and its corresponding point on the flight line is found by projecting the value along a line normal to a reference line that connects the endpoints of the flight line. The flight line defines a negative 200 gamma baseline, and the magnetic values were plotted at a 200 gamma/inch scale starting at the flight line.

The smooth, low-amplitude character of most of the profiles reflects variations in magnetic susceptibility far below the surface. In contrast, many of the steep or high-amplitude features correspond to mapped exposures of mafic igneous rocks indicating that most of the sharp anomalies represent mafic igneous rocks near or at the surface. Generally, these igneous rocks are diabase sills in terranes of the Ipanvik River allochthon (no. 4 of Mayfield and others) that occur near the top of a deformed stack of broadly superposed thrust sheets. A few anomalies could reflect thin sills locally intruded into the lowest, Brooks Range (No. 1 of Mayfield and others) allochthon. The decreasing magnetic field strength going to the west is yet unexplained (sheet 1). However, the contours of Area A clearly reflect sills in the Ipanvik sequence as it wraps around Nuka Ridge (sheet 3). The high anomalies at the south end of some profiles sharply delimit synforms of shallow- and deep-seated ophiolitic rocks that make up the Misheguk Mountain and Copter Peak (No. 6 of Mayfield and others) on top of the stack.

This report represents an effort to make the two sets of magnetic profiles as easily comparable as possible and present them on one map along with the generalized geology. Anyone considering mathematical analysis of individual anomalies or a study of deeper geologic features should use the earlier releases or request access to the original data.

**ACKNOWLEDGMENT**

I am extremely grateful for the comments and suggestions made by the reviewers, and especially to D. F. Barnes and R. C. Jachens for their many contributions toward completion of this Open-File Report.

**REFERENCES**

- Decker, J. E., 1977, Preliminary aeromagnetic map of the Brooks Range and Arctic Slope, Alaska: U.S. Geological Survey Open-File Report 77-166-E.
- Geophysical Services, Inc., 1978, Interpretation of the FT '77 Aerial gamma-ray and magnetic survey of portion of National Petroleum Reserve in Alaska: National Oceanic and Atmospheric Administration, and Environmental Data and Information Service, 7 p.
- Mayfield and others, 1978, Generalized Geologic base map for the National Petroleum Reserve in Alaska: U.S. Geological Survey Open-File Report 78-708.
- Tailleur, I. L., Kent, B. H., Reiser, H. N., 1966, Outcrop geologic maps of the Nuka Etivluk region, northern Alaska: U.S. Geological Survey Open-File Report 260; 7 sheets, scale at 1:63,360.
- U.S. Geological Survey, 1972, Aeromagnetic data from S. W. Naval Petroleum Reserve, Alaska: U.S. Geological Survey, Open-File Report 505.
- Woolson, J. R., and others, 1962-63, Seismic and gravity surveys of Naval Petroleum Reserve No. 4 and adjoining areas, Alaska: U.S. Geological Survey Professional Paper 304-A, 25 p.