

600257

FC
USGS
OFR
76-288

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Magnetotelluric soundings in the
Darrough Hot Springs Area, Nevada

Nye Co.

By

J.E. O'Donnell

U.S. Geological Survey

Open-file Report No. 76-288
1976

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

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

Magnetotelluric Soundings in the Darrough
Hot Springs Area, Nevada

By J.E. O'Donnell

Two magnetotelluric soundings (MTS) were made in the Darrough Hot Springs area, one at the hot springs ($38^{\circ} 49' 29''$ latitude, $117^{\circ} 10' 55''$ longitude) and the other four miles east ($38^{\circ} 49' 20''$ latitude, $117^{\circ} 06' 30''$ longitude) of the hot springs. The Cagniard resistivities are tabulated in table one along with the audio-magnetotelluric data for the hot springs and the one-dimensional model apparent resistivities derived from the data. The MTS data (.01-.3 Hz) is strongly anisotropic with the north-south (ρ_x) resistivities being approximately a factor of ten greater than the east-west (ρ_y) resistivities for the lower frequencies. Further more the data was found to be too three-dimensional for two-dimensional tensor analysis. An average apparent resistivity was made (table 1) for the Darrough Hot Springs site and then used for inversion data to produce the model given in table 2.

SITE: DARROUGH HOT SPRINGS

COMPUTED
MODEL DATA
FROM $\bar{\rho}$ FOUR MILES EAST OF
DARROUGH HOT SPRINGS

f	ρ_x	ρ_y	$\bar{\rho}$	ρ_A	ρ_x	ρ_y
0.01	12	3.0	4.0	5.0	20.0	0.6
0.04	80	10.0	10.0	6.4	70.0	4.0
0.08	4	0.6	1.5	4.6	7.0	0.7
0.12	3	0.4	1.1	3.5	2.0	0.7
0.16	3	0.8	1.5	2.8	1.2	0.9
0.20	3	1.0	1.7	2.4	1.5	0.9
0.24	6	1.0	2.4	2.2	1.5	0.8
0.28	10	3.0	5.5	2.0	1.0	2.0
7.5	5.7	5.0	5.3	2.9		
10.0	6.3	2.6	4.0	3.2		
14.0	5.3	3.0	4.0	3.7		
27.0	5.9	3.9	4.8	4.9		
76.0	6.6	6.3	6.4	8.5		
285.0	9.2	10.6	9.9	21.5		
6700.0	786.0	108.0	290.0	330.0		
10200.0	826.0	309.0	500.0	475.0		

TABLE 1 CAGNIARD RESISTIVITIES AND FREQUENCIES FOR TWO SITES AND MODEL RESISTIVITIES COMPUTED FOR DARROUGH HOT SPRINGS.

LAYER	RESISTIVITY (OHM-METRES)	THICKNESS (METRES)
1	800.0	80
2	1.6	340
3	4.0	230
4	0.6	160
5	60.0	6400
6	0.5	--

TABLE 2 THEORETICAL MODEL USED TO DERIVE APPARENT RESISTIVITIES
GIVEN IN TABLE 1.