

BIBLIOGRAPHY OF GEOPHYSICAL  
STUDIES AND DATA IN THE  
SAN CARLOS-SAFFORD-DUNCAN  
NONPOINT-SOURCE MANAGEMENT  
ZONE, ARIZONA

by  
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Arizona Geological Survey  
**Open-File Report 98-7**

May, 1998

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*Produced for the Arizona Department of Environmental Quality*

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



This report provides references for geophysical data in the San Carlos-Safford-Duncan Nonpoint-Source Management Zone (Figure 1). Types of studies and geophysical data include magnetic, resistivity, gravity, remote sensing, radioactivity, and heat flow data derived from airplanes, satellites, field studies, and laboratory measurements. Geophysical surveys in the management Zone include:

*Gravity methods*

Gravity data is used to distinguish masses of rock, based on their different densities, and to determine depth-to bedrock in deep alluvial basins.

*Magnetic methods*

Magnetic surveys can be used to identify rock types and discern mineralized areas. Measuring the strength and orientation of the rock's magnetism yields information about the history of the rock. Airborne magnetic surveys measure the strength of the earth's magnetic field as modified by local variations caused by the magnetic properties of the rocks under the flight line. Magnetic and electrical anomalies can be used to search for ore bodies, delineate structures and contacts, and identify possible rock types at depth.

*Electrical methods*

Electrical methods rely on measuring differences in natural potential between points, and the resistivity (the inverse of conductivity) of different materials. Magneto-telluric methods compare the amplitudes and phases of the electric and magnetic fields that are produced by the flow of telluric currents (Parasnis, 1962). Telluric currents are a combination of natural and artificial currents that produce potential differences between points on the earth's surface.

*Remote sensing*

Remote sensing data are used to discriminate altered or mineralized areas, map structural features, and analyze vegetation patterns.

*Heat flow*

Heat flow measurements can point to areas of anomalous heat content and delineate potential geothermal reservoirs.

*Radioactivity*

Radioactivity methods measure radiation from the decay of naturally-occurring radioactive elements found in all rocks, soil, and water. Discussions of radioactivity surveys in the management Zone are found in Harris (1994), and Harris and Richard (1996).

Geophysical surveys are often run in boreholes during drilling of water wells, oil exploration wells, and mineral exploration holes. These tests include resistivity, self-potential, neutron (formation density), gamma-ray activity, and borehole sonic measurements. The AZGS has geophysics logs for several water and oil wells in the Management Zone. Table 1 lists the geophysics data available for these wells.

This bibliography includes geophysics-related references taken from the previously published comprehensive bibliography for the Management Zone by Trapp and Harris (1997), with some additional references.



Table 1. Geophysical logs available for water and oil wells in the Management Zone.

<u>LOCATION</u>	<u>AZGS</u>	<u>O&amp;G</u>	<u>NAME</u>	<u>DI</u>	<u>RES</u>	<u>SP</u>	<u>CN</u>	<u>CS</u>	<u>GAM</u>	<u>SS</u>
D(6-25)36cbb	495		Smithville Canal Well		X	X				
D(7-26)aaa	1580		Alf Claridge (a.k.a. No Name)		X	X			X	
D(9-26)16ab	4207	798	Phillips Petrol. #1 Safford State	X	X	X	X	X		X
D(14-30)36add	337	21	Arizona Oil & Gas #1 State		X	X				
D(16-31)10aaa	814	48	L.A. Thompson #1 State		X	X				

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*Geophysical logs:*

*DI = dual induction*

*SP = self-potential*

*CS = compensated sonic*

*SS = synthetic seismic*

*RES = resistivity*

*CN = compensated neutron - formation density*

*GAM = gamma ray activity*

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