PRELIMINARY COMPILATION OF DATA FOR SELECTED OIL TEST WELLS IN NORTHERN CALIFORNIA

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Open-file Report 01-152

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

INTRODUCTION

Oil test wells can provide information on the depth, age, inclination, porosity, permeability, density, faulting, folding, and organic content of geologic formations mapped at the surface, or on units not recognized in surface outcrops. Formation density, as expressed in sonic and density logs commonly obtained when wells are drilled, has become increasingly important in making a crustal-scale 3-D seismic velocity model for the San Francisco Bay region. This model will be used for the calculation of realistic strong-ground motion synthetic seismograms (Brocher and others, 1997), and to determine the geometry of the basement surface beneath Tertiary basins (Jachens and others, 1997). The availability of this density and other information for oil test wells has, until recently, been restricted for competitive reasons, but several petroleum companies have recently made these data available. Accordingly, we began in 1992 to obtain these data to help prepare new geologic maps and geophysical models for the San Francisco Bay region, and to share the information with the public.

AREA COVERED

This report contains brief descriptions of information and materials available for 1,550 oil exploration and production wells in the following counties: Alameda (42), Butte (31), Colusa (103), Contra Costa (102), Glenn (103), Humboldt (33), Marin (6), Mendocino (2), Merced (33), Monterey (172), Napa (5), Placer (2), Sacramento (72), San Benito (51), San Joaquin (164), San Mateo (73), Santa Clara (8), Santa Cruz (23), Shasta (3), Siskiyou (1), Solano (251), Sonoma (10), Stanislaus (29), Sutter (59), Tehama (59), and Yolo (113).

TYPES OF DATA

We have been most interested in wells that have sonic and density logs, depths to the various geologic formations, information on lithology, the names, character, and diversity of microfossils, the original slides or vials with foraminifers or nannoplankton, and paleo logs that indicate the character of the microfossils at various depths. Where available, we have also collected electrical logs (E logs) and mud logs, which show the drilling rate, visual porosity, lithology, oil and gas content, physical properties and chemistry of the drilling mud, and a description of the cuttings. In the database, density logs are included in the space allocated for sonic logs.

The most useful paleo logs (shortened from paleontology logs) have an electrical log on the left side, formation names and biostratigraphic stages, zones, and ages in the middle, and a description of fossils and unusual minerals in a column on the right. Many paleo logs also have information that was not transferred to this summary, such as strike and dips of bedding and the character of other fossils from the well.

Many slides with foraminifers (shortened to forams for brevity throughout this report) from cores and cuttings were received with no accompanying data. Presumably data for these wells are available from Jennings and Hart (1956), the

California Division of Oil and Gas, published reports in libraries, or from commercial oil-well data companies.

Nearly every slide has 3 circular compartments for forams. Most of these compartments have only loose forams, but a few picked and mounted material. Vials contain mainly loose forams, silt, and sand grains.

Many more wells are available than shown in this list. Wells drilled prior to 1950 were generally omitted if the data are sparse. Conversely, some well files are enormous, occupying several feet of shelf space in an oil company library, but we copied only the data of most interest to our projects.

ARRANGEMENT OF THE DATA IN THIS REPORT

Within each county, the data are arranged alphabetically by lease name followed by the name of the company responsible for the well. Because both names may have changed over time, we have provided former names when known. The exceptions are Chevron, formerly Standard; Arco, formerly Richfield ; Exxon, formerly Humble; Texaco, formerly The Texas Co.; and Unocal, formerly Union.

The section, township and range are from the data provided, and were checked only for wells of interest to our projects. The number provided at the beginning of the geology notes section is a company reference number for the well. The rest of the information in the geology notes was taken mainly from data obtained from the various oil companies.

PROBLEMS WITH THE DATA

Almost every entry in our report may have errors, even such things as section, township, range, county, quadrangle name, and drilling depth. The depths and ages given for formations are particularly subjective. Few of these formations are defined in accordance with the North American Stratigraphic code, and their position in a well may be defined by correlation with nearby wells, by paleontologic or mineral content, by geochemical or geophysical character, or by thermal maturation. Zone and stage assignments generally follow those of Laiming (1943), Goudkoff (1945), Kleinpell (1938) and Mallory (1959), but Poore (1980), Almgren (1986), Almgren and others (1988), and several others have pointed out major difficulties in using these stratigraphic standards. Moreover, some oil company micropaleontologists have not made rigorous distinctions between paleontologic and lithologic terms. The use of the term “Capay”, for example, could mean a rock correlative with coarse clastic rocks in the Capay’s type area but it is almost certainly a faunal term for a shale with Eocene faunas correlative with the C zone of Laiming. If an electrical log is provided, the lithology can be checked, but many paleo logs do not have electrical logs.

Many of the ages on the paleo logs are obsolete. The Paleocene was not recognized in California until the late 1930’s, and the zone assignments have also changed. We have attempted to update this information, so that the data in our report do not correspond exactly with the original data. Similarly, we have inferred lithologic information for some names when the lithology is not provided in the data, such as shale for the Capay and sandstone for the Markley.

The Domengine, however, may mean a glauconitic sandstone, a white sandstone, or a sandstone and shale sequence. An electrical log is very helpful in checking names used by paleontologists.

The quality of the foram faunas (sparse, fairly good, and good) reflects a casual look at the list of forams on the well log. The quality is affected by the spacing of the washed samples, commonly 20 feet but as large as thousands of feet, or the samples may never have been washed. Quality will also be affected by washing techniques, character of preservation, and how the samples were obtained. Some companies for example, will only loan or give incomplete or poorer parts of their collection to another company. Core samples generally yield better preserved specimens than ditch samples.

Reworking of forams into younger formations and caving of forams into older formations is apparently common in many wells. Lab contamination is also common. Hopefully, the paleontologist will make comments on the paleo log about these occurrences.

The slides may be numbered consecutively, but the shallowest and deepest samples may not be in order. Moreover, the numbers on the slide may be interspersed with letters, so that the highest number may not be the total number of slides. Some slides are marked with depths greater than the total depth given for the well.

The problem of correlating between written data and foram slides is especially difficult because the foram slides provide the original names and the written data the newer names, and neither may have any of the same names. Several wells have the same lease name but different company names, and the data may be insufficient to determine if the wells are the same or different.

For all of these reasons, our report **should not be used as an authoritative source**, but only as a general guide to the kind of information available in selected company files.

ACKNOWLEDGEMENTS

We are most grateful to the paleontologists, geologists, and managers with Chevron, Unocal, and Exxon, who provided most of the materials for this report, or allowed us access to their files. We are also grateful to personnel in Texaco, Arco and Shell for their contributions. Richard Stanley, U. S. Geological Survey, Richard Thorup and Alvin Almgren, consultants, and Joseph Clark, Indiana University of Pennsylvania, kindly donated well logs and other materials for our project. Bette Hamachi organized the files several years ago, and Louise Dickerson made an early draft of information available from a published report by Jennings and Hart (1956). U. S. Geological Survey volunteers John Parker, Larry Dickerson (deceased), William West, Karen Wild, Purty Dorn, Sonoko Migitaka, Domenique Granier, and others helped in many ways.

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