MANAGEMENT SUMMARY

In November and December, 2002, at the request of RBF Consulting, CRM TECH performed a paleontological resource assessment on a proposed pipeline route located near the City of Brea, Orange County, California. The development project involves the construction of two sewer pipeline segments measuring approximately 3,300 feet in total length, traversing through Sections 8 and 17, T3S R9W, San Bernardino Base Meridian. The study is part of the environmental review process for the proposed Reinstatement of Carbon Canyon Dam Sewer and Pump Station Abandonment project. The Orange County Sanitation District, as Lead Agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA).

The purpose of the study is to provide the Orange County Sanitation District with the necessary information and analysis to determine whether the proposed development would potentially disrupt or adversely affect any paleontological resources, as mandated by CEQA, and to design a paleontological salvage program for the project, if necessary. In order to identify any paleontological resource localities that may exist in or near the project area and to assess the possibility for such resources to be encountered in future excavation and construction activities, CRM TECH initiated records searches at the San Bernardino County Museum and the Natural History Museum of Los Angeles County, conducted a literature search, and carried out a field survey of the project area in accordance with the guidelines of the Society of Vertebrate Paleontology.

Based on the results of these research procedures, the proposed project's potential impact on paleontological resources in the area west of the well pad, the location of the proposed drilling pit located at the southernmost end of the northeastern section of the project area, and the entire southeastern portion of the proposed pipeline route is determined to be high. A paleontological resource recovery program and monitoring of earth-moving activities is therefore recommended for these areas of the proposed project.

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INTRODUCTION

In November and December, 2002, at the request of RBF Consulting, CRM TECH performed a paleontological resource assessment on a proposed pipeline route located near the City of Brea, Orange County, California (Fig. 1). The development project involves the construction of two sewer pipeline segments measuring approximately 3,300 feet in total length, traversing through Sections 8 and 17, T3S R9W, San Bernardino Base Meridian (Fig. 2). The study is part of the environmental review process for the proposed Reinstatement of Carbon Canyon Dam Sewer and Pump Station Abandonment project. The Orange County Sanitation District, as Lead Agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.).

CRM TECH performed the present study to provide the Orange County Sanitation District with the necessary information and analysis to determine whether the proposed development would potentially disrupt or adversely affect any paleontological resources, as mandated by CEQA, and to design a paleontological salvage program for the project, if necessary. In order to identify any paleontological resource localities that may exist in or near the project area and to assess the possibility for such resources to be encountered in future excavation and construction activities, CRM TECH initiated records searches at the San Bernardino County Museum and the Natural History Museum of Los Angeles County, conducted a literature search, and carried out a field survey of the project area in accordance with the guidelines of the Society of Vertebrate Paleontology. The following report is a complete account of the methods, results, and final conclusion of the study.

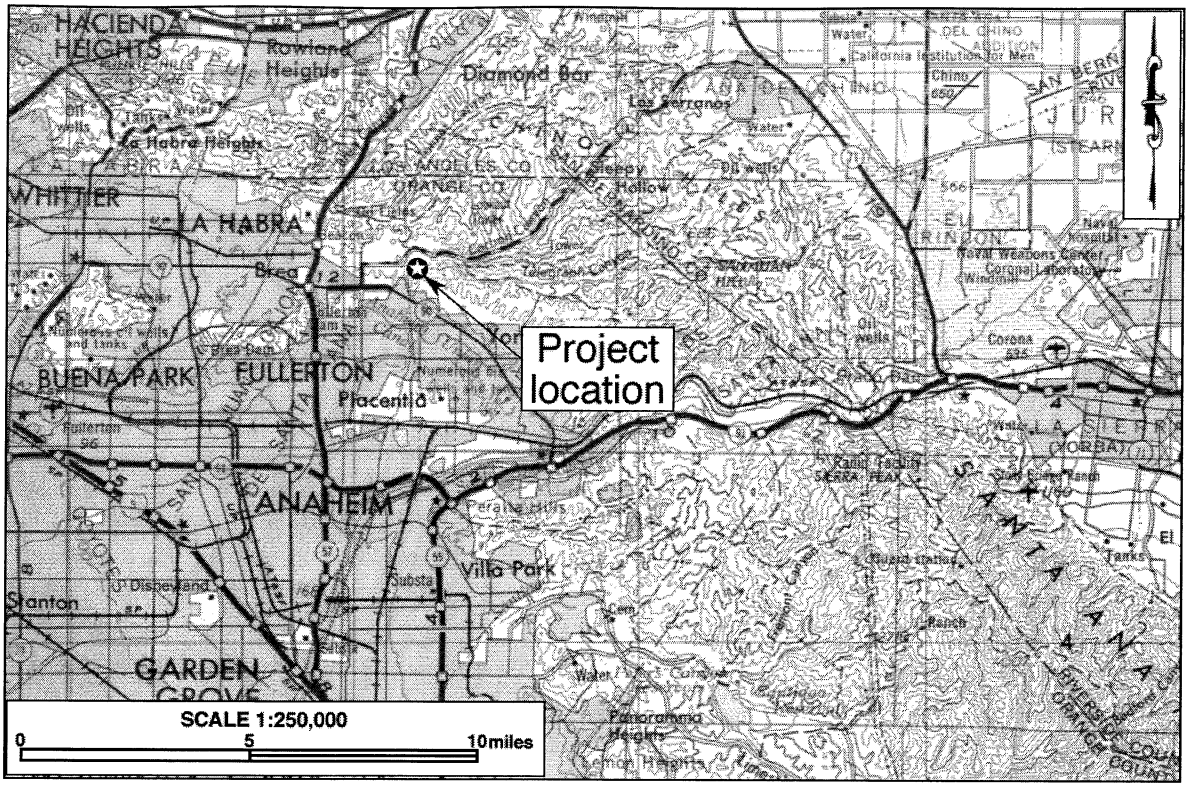

Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 1:250,000 quadrangle [USGS 1979])

Figure 2. Project area. (Based on USGS Yorba Linda, Calif., 1:24,000 quadrangle [USGS 1981])

REGIONAL SETTING

The project area is located within the Puente Hills portion of the greater Los Angeles Basin (Yerkes et al. 1965:A5), a structural basin that developed on the northwestern end of the Peninsular Ranges province (Jenkins 1980:40-41). This portion of the Peninsular Ranges is bounded on the north by the Transverse Ranges, to east by the Colorado Desert, and extends offshore under the Pacific Ocean (*ibid.*). The Los Angeles Basin, at its deepest point, is filled by more than 20,000 feet of Miocene and later sedimentary rocks (Woodring et al. 1954:65; Yerkes et al. 1965:A4).

The Puente Hills are a structurally uplifted feature along the north side of the Whittier (Puente Hills) Fault, which is part of the same fault system that produced the magnitude 5.9 Whittier Narrows earthquake on October 1, 1987 (Oskin 2002:1). Based on oil field drilling, rocks of Middle Miocene age rest unconformably on a metamorphic basement within the East Puente Hills (Gaede et al. 1967:16-17), which suggests that these hills are geologically a rather recent feature. The uplift mainly exposes marine derived rocks of late Miocene through Pliocene age with non-marine rocks of Pleistocene through Recent age in the canyons and along the southern flank (Durham and Yerkes 1959).

The project area is situated near Carbon Canyon Dam, at elevations ranging around 420-500 feet above mean sea level. The northeastern segment of the proposed pipeline route is located within an area that has been leveled in the past. Soils at this locality are identified as alluvium and a dense growth of vegetation covers the surface (Fig. 3). An access road was noted in the southern portion of a proposed drilling pit located at the northernmost end of this segment of the pipeline. The southwestern segment of the pipeline crosses a large gully in the north and a terrace in the south. The gully possesses dense vegetation growth while the terrace has been plowed and farmed.

Figure 3. Overview of the current natural setting of the northeastern portion of the project area. (Photo taken on November 13, 2002)

METHODS AND PROCEDURES

RECORDS SEARCHES

The records search service was provided by the Regional Paleontologic Locality Inventory located at the San Bernardino County Museum in Redlands and the Natural History Museum of Los Angeles County in Los Angeles. These institutions maintain files of regional paleontological site records as well as supporting maps and documents. The records search results are used to identify previously performed paleontological resource assessments and known paleontological localities near the project area. In addition, a literature search was conducted using materials in the CRM TECH library and the personal library of the author, including unpublished reports from surveys of other properties in the vicinity.

FIELD SURVEY

On November 13, 2002, CRM TECH geologist/paleontologist Harry M. Quinn (see App. 1 for qualifications) carried out the intensive-level, on-foot field survey of the project area. The northeast segment of the pipeline was not intensively surveyed because dense vegetation impeded access to this location. Quinn did manage, however, to carry out a reconnaissance-level inspection of the area by following an access road situated above the project area and by walking along a riding and hiking trail below it. Spot checks of the proposed pipeline alignment in this area were made when possible. The southwestern segment of the project area was surveyed by walking along both sides of the proposed pipeline route. The results of the survey are discussed below.

RESULTS AND FINDINGS

EXISTING DATA SUMMARY

The paleontology records searches indicate that several paleontological localities have been previously reported within and outside of the one-mile radius of the project area, localities which are known to have produced fossils from sediment lithologies similar to those in the subject property (McLeod 2002; Scott 2002). However, no paleontological sites have been discovered within the boundaries of the project property but sites are known from areas within a couple of miles (*ibid.*). Based on these previous discoveries, the San Bernardino County Museum assigns the project area "high paleontological sensitivity" and declares the proposed project to have a "high potential to impact significant nonrenewable fossil resources," for both invertebrate and vertebrate fossils (Scott 2002).

Durham and Yerkes (1964:B22) provide a listing of foraminiferal faunas recovered during past studies of the Sycamore Canyon Member of the Puente Formation and note that these fossils are scarce to absent in many outcrop exposures. They also give a listing of mega fossils found during studies of the Lower Member of the Fernando Formation and state that microfossils (mainly foraminifera) are also known to occur in abundance from some portion of these rocks as well (*ibid.*:B 25). Gaede et al. (1967:15) show the foraminiferal zones used to differentiate the different formations during the development of the Brea-Olinda Oil Field. McLeod (2002) reports on the findings of a rich marine vertebrate fauna from both the Late Miocene Sycamore Canyon Member of the Puente Formation and Lower Member of the Fernando Formation. He also reported the finding of horse and camel fossils from the uppermost portion of the Fernando Formation. Scott (2002) referred mainly to the abundance of marine invertebrate fossils recovered from these two formations, but does include the potential for plant and vertebrate fossils as well. Both McLeod and Scott emphasize the potential for finding terrestrial vertebrate remains within the older terrace deposits of Pleistocene through Holocene age.

GEOLOGY

Rogers (1965) mapped the onsite geology as Mu, Pml, Pu, and Qc. He defines the Mu as Upper Miocene marine, the Pml as Middle and/or Lower Pliocene marine, the Pu as Upper Miocene marine, the Qc as Pleistocene non-marine. The rock material filling the valley in which the project area is located is mapped as Qal by Durham and Yerkes (1959). They define the Qal as Quaternary (Recent) alluvium consisting of unconsolidated to poorly consolidated gravel, sand, and an earthy silt. Durham and Yerkes (1964:B31) describe this material as filling the bottoms of the canyons and having a lack of consolidation and a fresh, un-weathered appearance. The hills on both sides of the project area are mapped as Tpsc (Sycamore Canyon Member of the Upper Miocene age Puente Formation) on the northern end and Tfr (Repetto Formation of the Pliocene Age Fernando Group) through most of the exposed area down toward the dam (*ibid.*). Some Tfu (unnamed series of the Repetto Formation of the Pliocene Age Fernando Group) is evident on the southernmost portion of the hill along the west side of the canyon only, down near the dam (*ibid.*).

The area west of the dam, where the southwestern portion of the pipeline is to be run, is mapped as Qt (*ibid.*). The Qt is described as terrace and older alluvial deposits consisting of semi-consolidated sand, gravel, and rubble. These sediments are commonly reddish-brown in color and are shown to range in age from late Pleistocene through early Holocene (*ibid.*). What was mapped as Qt by Durham and Yerkes (1959) has been described later as Pleistocene to Recent alluvial deposits commonly present along the flanks of the Puente Hills (Durham and Yerkes 1964:B30-B31). These semi-consolidated deposits are dissected by the present stream channels (*ibid.*:30). While no dateable fossils are reported to have been found in these older alluvial deposits, the Southern Counties Petroleum and Drilling

Corp. Well #1, within Section 22 of T2S R8W, did encounter tree logs within these alluvial sediments at a depth of 380 feet below the ground surface (*ibid.*).

The project area contains a portion of the Brea-Olinda Oil Field (Durham and Yerkes 1959), which was discovered about 1897 because of natural tar seepage along the faults (Durham and Yerkes 1964:B39). This portion of the oil field was nearly fully developed by the mid-1950's (*ibid.*). One of the well pads is located directly within the path of proposed pipeline installation.

PALEONTOLOGY

During the field survey no paleontological resources were found; however, the rocks observed within the project area were found to match those mapped by Durham and Yerkes (1959). The confirmation of the presence of the Upper Miocene Sycamore Canyon Member of the Puente Formation, the Lower Member of the Pliocene Fernando Formation, and the presence of older terrace deposits in various locations along the proposed pipeline alignment supports the potential for subsurface fossil being present as described by McLeod (2002) and Scott (2002).

DISCUSSION

The field survey results, supported by literature research, indicate that the project area has a high potential for paleontological resources and should be monitored by a qualified paleontologist during earthmoving activities within most of the subject property. Within the northern end of the northeast section of the project area, monitoring of grading activities will not be required in the area east of a well pad because of past grading activities at this locality. The area to the west of the well pad, however, is bedrock mapped as the Tpsc, or Sycamore Canyon Member of the Upper Miocene age Puente Formation and Tfr, or Repetto Formation of the Pliocene Age Fernando Group (Durham and Yerkes 1959). The Sycamore Canyon Member is shown to only contain foraminifera, or micro fossils (Durham and Yerkes 1964:B22). The Fernando formation is shown to contain both foraminifera and mollusks (*ibid.*:B25). Therefore, monitoring of the deep trenching activities that may take place in the area west of the well pad should be required.

The area south of the well pad has been mapped as Qal by Durham and Yerkes (1959). A road located above and nearly parallel to this portion of the project area possesses good exposures of both the Puente Formation along the northern end and of the Fernando Group along the middle and southern sections. Based on the slope of the hill, the entire length of this portion of the project area should be in Qal. Since this segment of the proposed pipeline route has been impacted by past earthmoving activities, no monitoring in this area is required. However, a proposed drilling pit located at the southernmost end of this northeastern section of the project area will most likely be excavated deep enough

to impact bedrock. Thus monitoring at the drilling pit area is recommended. In case the proposed pipeline route changes to include areas that have not been disturbed by past grading, paleontological monitoring is also recommended.

The southeastern segment of the project area is located on soils mapped as Qt, or older Terrace and Alluvial deposits (Durham and Yerkes 1959). These deposits have a high potential for fossil remains, especially vertebrate land fossils (McLeod 2002; Scott 2002). Therefore, the entire southeastern portion of the proposed pipeline route needs to be monitored for paleontological resources.

RECOMMENDATIONS

Based on the study results presented above, the proposed project's potential impact on paleontological resources on portions of the project area is determined to be high. Therefore monitoring of earth-moving activities for paleontological resources during excavation and grading of these areas and a program to mitigate impacts to the resources that might be exposed or unearthed during all such excavation is recommended. Such a program should be developed in accordance with the provisions of CEQA as well as with regulations currently implemented by the Orange County Sanitation District and the proposed guidelines of the Society of Vertebrate Paleontology, and should include, but not be limited to the following, as outlined by Scott 2002.

- The excavation of areas identified as likely to contain paleontologic resources should be monitored by a qualified paleontological monitor. Monitoring should be done on all undisturbed subsurface areas with bedrock, older alluvium, and alluvium which might be present below the surface. The monitor should be prepared to quickly salvage fossils as they are unearthed to avoid construction delays. The monitor should also remove samples of sediments which are likely to contain the remains of small fossil invertebrates and vertebrates. The monitor must have the power to temporarily halt or divert grading equipment to allow for removal of abundant or large specimens.
- Collected samples of sediments should be washed to recover small invertebrate and vertebrate fossils. Recovered specimens should be prepared so that they can be identified and permanently preserved.
- Specimens should be identified and curated and placed into a repository with permanent retrievable storage.
- A report of findings, including an itemized inventory of recovered specimens, should be prepared upon completion of the steps outlined above. The report should include a discussion of the significance of all recovered specimens. The report and inventory, when submitted to the Orange County Sanitation District, would signify completion of the program to mitigate impacts to paleontological resources.

CONCLUSION

CEQA Appendix G provides that "a project may be deemed to have a significant effect on the environment if it will . . . disrupt or adversely affect a . . . paleontological site except as a part of a scientific study." The present study, conducted in compliance with this provision is designed to identify any significant, non-renewable paleontological resources that may exist within or adjacent to the project area, and to assess the possibility for such resources to be encountered in future excavation and construction activities.

Based on the results of the records and literature search and the field inspection, the proposed project's potential impact on paleontological resources in portions of the project area is determined to be high. A paleontological resource recovery program and monitoring of earth-moving activities is therefore recommended for these parts of the project.

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Yerkes, R. F., T. H. McCulloh, J. E. Schoellhamar, and J. G. Vedder
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APPENDIX 1:

PERSONNEL QUALIFICATIONS

PRINCIPAL INVESTIGATOR
Bai "Tom" Tang, M.A.

Education

1988-1993	Graduate Program in Public History/Historic Preservation, UC Riverside.
1987	M.A., American History, Yale University, New Haven, Connecticut.
1982	B.A., History, Northwestern University, Xi'an, China.
2000	"Introduction to Section 106 Review," presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994	"Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside, California.
1993-2002	Project Historian/Architectural Historian, CRM TECH, Riverside, California.
1993-1997	Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993	Project Historian, Archaeological Research Unit, UC Riverside.
1990	Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992	Teaching Assistant, History of Modern World, UC Riverside.
1988-1993	Research Assistant, American Social History, UC Riverside.
1985-1988	Research Assistant, Modern Chinese History, Yale University.
1985-1986	Teaching Assistant, Modern Chinese History, Yale University.
1982-1985	Lecturer, History, Xi'an Foreign Languages Institute, Xi'an, China.

Honors and Awards

1988-1990	University of California Graduate Fellowship, UC Riverside.
1985-1987	Yale University Fellowship, Yale University Graduate School.
1980, 1981	President's Honor List, Northwestern University, Xi'an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California's Cultural Resources Inventory System (With Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

Membership

California Preservation Foundation.

PRINCIPAL INVESTIGATOR
Michael Hogan, Ph.D., RPA*

Education

1991	Ph.D., Anthropology, University of California, Riverside.
1981	B.S., Anthropology, University of California, Riverside; with honors.
1980-1981	Education Abroad Program, Lima, Peru.
2002	"Historic Artifact Workshop," presented by Richard Norwood.
2002	"Wending Your Way through the Regulatory Maze," presented by the Association of Environmental Professionals.
1992	"Southern California Ceramics Workshop," presented by Jerry Schaefer.
1992	"Historic Artifact Workshop," presented by Anne Duffield-Stoll.

Awards and Honors

1987-1988	Humanities Graduate Students Research Grant, U. C. Riverside.
1986-1987	Humanities Graduate Students Research Grant, U. C. Riverside.
1986-1987	Chancellor's Patent Fund, U. C. Riverside.
1982-1983	Graduate Council Fellow, Regents Fellowship Program, U. C. Riverside.
1981	Phi Beta Kappa.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside, California.
1999-2002	Project Archaeologist/Field Director, CRM TECH, Riverside.
1996-1998	Project Director and Ethnographer, Statistical Research, Inc., Redlands.
1992-1998	Assistant Research Anthropologist, University of California, Riverside
1992-1995	Project Director, Archaeological Research Unit, U. C. Riverside.
1993-1994	Adjunct Professor, Riverside Community College, Mt. San Jacinto College, University of California, Riverside, Chapman University, and San Bernardino Valley College.
1991-1992	Crew Chief, Archaeological Research Unit, U. C. Riverside.

1984-1998 Archaeological Technician, Field Director, and Project Director for various southern California cultural resources management firms.

Research Interests

Cultural Resource Management, Southern Californian Archaeology, Settlement and Exchange Patterns, Specialization and Stratification, Culture Change, Native American Culture, Cultural Diversity.

Cultural Resources Management Reports

Author, co-author, and contributor to numerous cultural resources management reports since 1986 while with the Archaeological Research Unit, Statistical Research, Inc., and CRM TECH.

Memberships

* Register of Professional Archaeologists.
Society for American Archaeology.
Society for California Archaeology.

PROJECT GEOLOGIST/PALEONTOLOGIST

Harry M. Quinn

Education

1968 M.S., Geology, University of Southern California, Los Angeles, California.
1964 B.S, Geology, Long Beach State College, Long Beach.
1962 A.A., Los Angeles Harbor College, Wilmington, California.

- Graduate work oriented toward invertebrate paleontology; M.S. thesis completed as a stratigraphic paleontology project on the Precambrian and Lower Cambrian rocks of Eastern California.

Professional Experience

2000-Present Project Paleontologist, CRM TECH, Riverside, California.
1998-Present Project Archaeologist, CRM TECH, Riverside, California.
1992-1998 Independent Geological/Geoarchaeological/Environmental Consultant, Pinyon Pines, California.
1994-1996 Environmental Geologist, E.C E.S., Inc, Redlands, California.
1988-1992 Project Geologist/Director of Environmental Services, STE, San Bernardino, California.
1987-1988 Senior Geologist, Jirsa Environmental Services, Norco, California.
1986 Consulting Petroleum Geologist, LOCO Exploration, Inc. Aurora, Colorado.
1978-1986 Senior Exploration Geologist, Tenneco Oil E & P, Englewood, Colorado.