PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

SAN JACINTO MASTER DRAINAGE PLAN LINE C, STAGE 2, C-4, C-5, AND LINE B

In the Cities of San Jacinto and Hemet
Riverside County, California

Prepared for:

Cheryl DeGano
Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506
(951) 248-4260

Submitted to:

Riverside County Flood Control and Water Conservation District
1995 Market Street
Riverside, CA 92501
(951) 955-1200

Prepared by:

Harry M. Quinn, Paleontologist/Geologist
Terri Jacquemain, Report Writer
CRM TECH
1016 E. Cooley Drive, Suite A/B
Colton, CA 92324
(909) 824-6400

Michael Hogan, Principal Investigator
Bai "Tom" Tang, Principal Investigator

July 17, 2012

CRM TECH Contract #2618P
Approximately 1.6 linear miles
San Jacinto, Calif., 7.5' (1:24,000) quadrangle
Within the San Jacinto Viejo land grant, T5S R1W, San Bernardino Baseline and Meridian

MANAGEMENT SUMMARY

In June and July 2012, at the request of Albert A. Webb Associates, CRM TECH performed a paleontological resource assessment for a proposed storm drain pipeline project in the Cities of San Jacinto and Hemet, Riverside County, California. The project area for the study consists of four contiguous pipeline alignments measuring approximately 1.6 miles in total length and lying across open fields or within the existing rights-of-way of paved roads, including San Jacinto Avenue, Midway Street, Santa Fe Avenue, and Menlo Avenue. It is located within a portion of the San Jacinto Viejo land grant in T5S R1W, San Bernardino Baseline and Meridian.

The study is part of the environmental review process for the installation of the four pipeline segments, designated as Line C, Stage 2, C-4, C-5, and Line B in the previously adopted San Jacinto Master Drainage Plan. The Riverside County Flood Control and Water Conservation District (RCFCWCD), as the 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 RCFCWCD with the necessary information and analysis to determine whether the proposed project would potentially impact or adversely affect any significant paleontological resources, as mandated by CEQA.

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 systematic field survey of the project area in accordance with the guidelines of the Society of Vertebrate Paleontology.

Based on the findings from these research procedures, the proposed project's potential to impact paleontological resources is determined to be low within the surficial deposit of Recent alluvium but high within the subsurface Pleistocene-age soils, which are known to lie at variable depths beneath the younger sediments. If the depth at which the undisturbed Pleistocene-age sediments will be encountered—i.e., the thickness of Recent surficial alluvium—cannot be determined through existing data, such as boring logs, periodic monitoring, or "spot-checks," will be necessary during excavations and other earth-moving activities.

The locations and depths at which to check for buried Pleistocene-age sediments are determined by the mapped location of the Casa Loma Fault across the project area. The portion of the project area southwest of the fault should be checked once excavations reach a depth of 10 feet, the portion northeast of the fault and west of Santa Fe Avenue should be checked beyond a depth of five feet, and the portion along Midway Street and San Jacinto Avenue and northeast of the fault should be checked periodically from the commencement of the earth-moving operations. Continuous monitoring, along with a program to mitigate impacts to any paleontological resources that may be unearthed, will be needed if the older Pleistocene-age sediments are encountered during the project.

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INTRODUCTION

In June and July 2012, at the request of Albert A. Webb Associates, CRM TECH performed a paleontological resource assessment for a proposed storm drain pipeline project in the Cities of San Jacinto and Hemet, Riverside County, California (Fig. 1). The project area for the study consists of four contiguous pipeline alignments measuring approximately 1.6 miles in total length and lying across open fields or within the existing rights-of-way of paved roads, including San Jacinto Avenue, Midway Street, Santa Fe Avenue, and Menlo Avenue (Figs. 2, 3). It is located within a portion of the San Jacinto Viejo land grant in T5S R1W, San Bernardino Baseline and Meridian (Fig. 2).

The study is part of the environmental review process for the installation of the four pipeline segments, designated as Line C, Stage 2, C-4, C-5, and Line B in the previously adopted San Jacinto Master Drainage Plan. The Riverside County Flood Control and Water Conservation District (RCFCWCD), as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the RCFCWCD with the necessary information and analysis to determine whether the proposed project would potentially impact or adversely affect any significant paleontological resources, as mandated by CEQA.

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 systematic 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 this study.

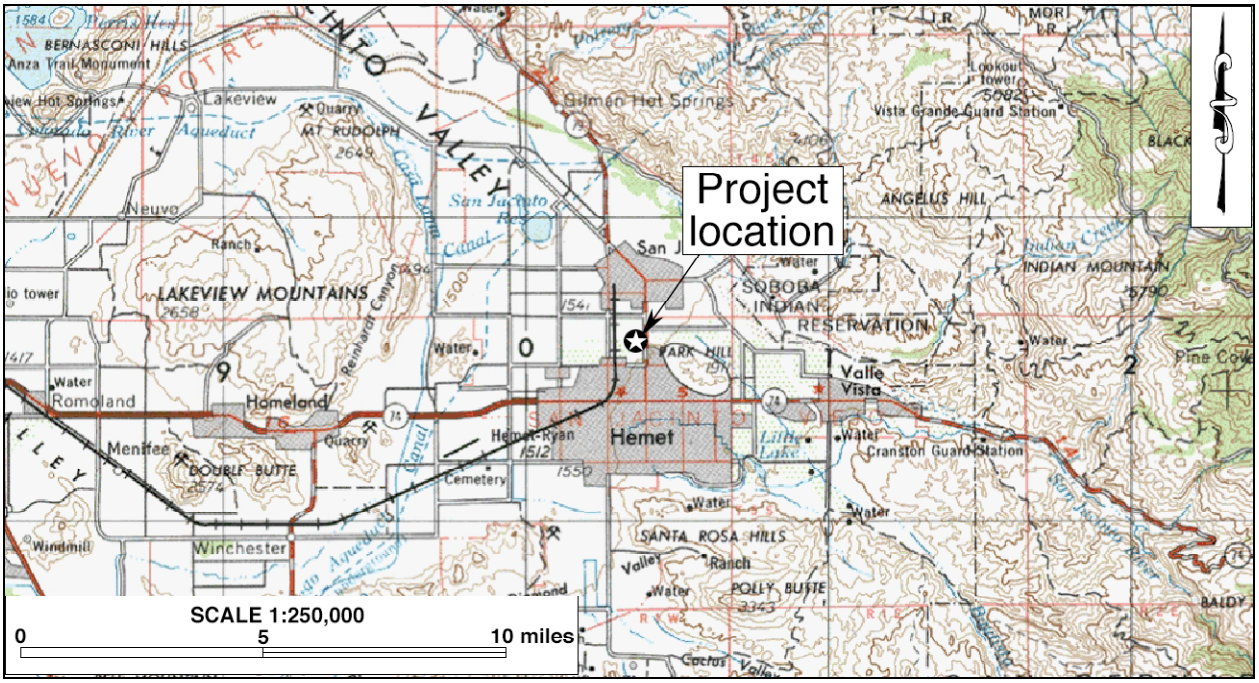

Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 1:250,000 quadrangle)

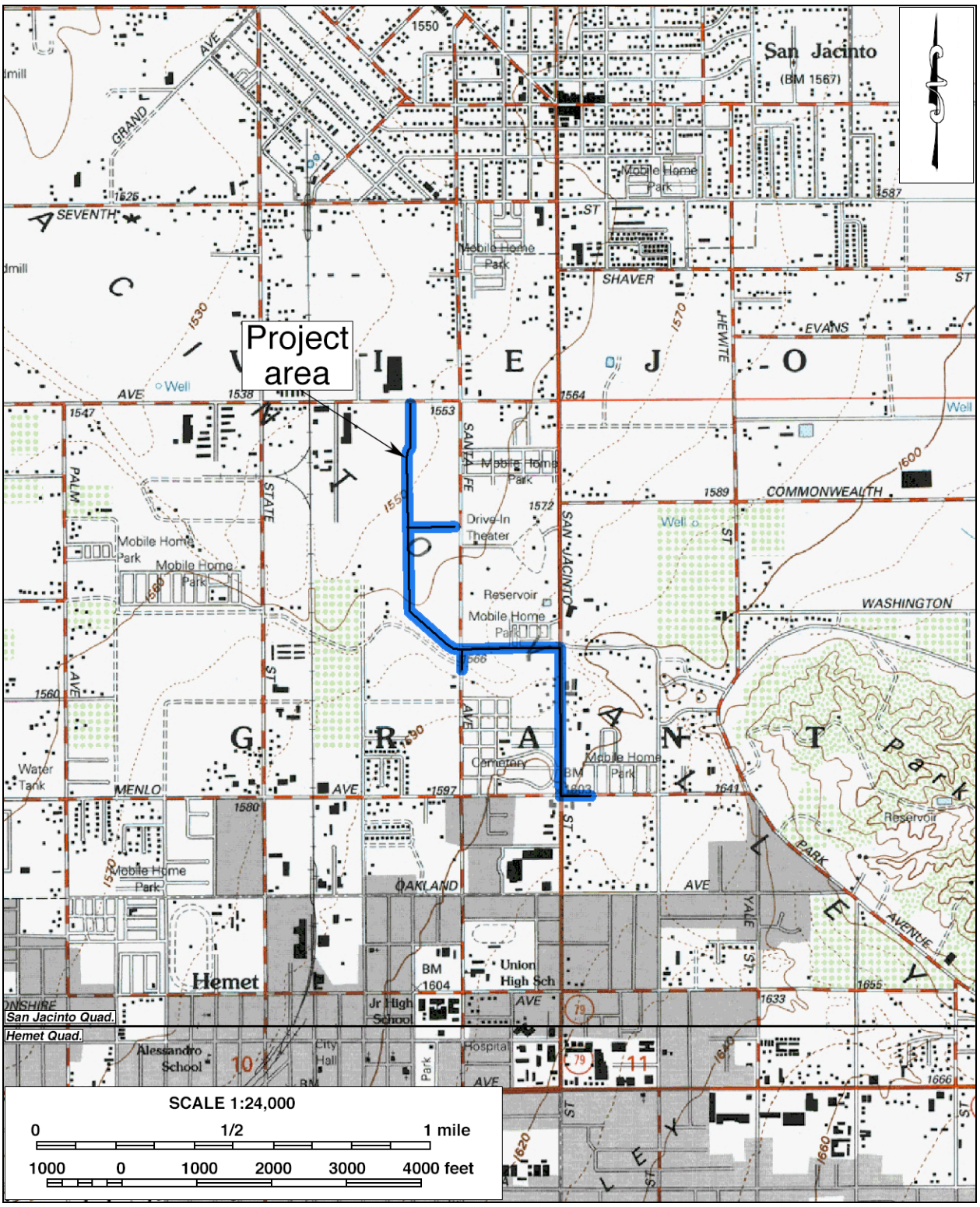

Figure 2. Project area. (Based on USGS San Jacinto and Hemet, Calif., 1:24,000 quadrangles)

PALEONTOLOGICAL RESOURCES

DEFINITION

Paleontological resources represent the remains of prehistoric life, exclusive of any human remains, and include the localities where fossils were collected as well as the sedimentary formations in which they were found. The defining character of fossils or fossil deposits is their geologic age, which is typically regarded as older than 10,000 years, the generally accepted temporal boundary marking the end of the last late Pleistocene glaciation and the beginning of the current Holocene epoch.

Common fossil remains include marine shells; the bones and teeth of fish, reptiles, and mammals; leaf assemblages; and petrified wood. Fossil traces, another type of paleontological resource, include internal and external molds (impressions) and casts created by these organisms. These items can serve as important guides to the age of the rocks and sediments in which they are contained, and may prove useful in determining the temporal relationships between rock deposits from one area and those from another as well as the timing of geologic events.

Fossil resources generally occur only in areas of sedimentary rock (e.g., sandstone, siltstone, mudstone, claystone, or shale). Because of the infrequency of fossil preservation, fossils, particularly vertebrate fossils, are considered to be nonrenewable paleontological resources. Occasionally fossils may be exposed at the surface through the process of natural erosion or as a result of human disturbances; however, they generally lay buried beneath the surficial soils. Thus, the absence of surface fossils does not preclude the possibility of their being present within subsurface deposits, while the presence of fossils at the surface is often a good indication that more remains may be found in the subsurface.

SIGNIFICANCE CRITERIA

According to guidelines proposed by Eric Scott and Kathleen Springer of the San Bernardino County Museum, paleontological resources can be considered to be of significant scientific interest if they meet one or more of the following criteria:

1. The fossils provide information on the evolutionary relationships and developmental trends exhibited among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or the interactions between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations. (Scott and Springer 2003:6)

PALEONTOLOGICAL SENSITIVITY

The fossil record is unpredictable, and the preservation of organic remains is rare, requiring a particular sequence of events involving physical and biological factors. Skeletal

tissue with a high percentage of mineral matter is the most readily preserved within the fossil record; soft tissues not intimately connected with the skeletal parts, however, are the least likely to be preserved (Raup and Stanley 1978). For this reason, the fossil record contains a biased selection not only of the types of organisms preserved but also of certain parts of the organisms themselves. As a consequence, paleontologists are unable to know with certainty, the quantity of fossils or the quality of their preservation that might be present within any given geologic unit.

Sedimentary units that are paleontologically sensitive are those geologic units (mappable rock formations) with a high potential to contain significant nonrenewable paleontological resources. More specifically, these are geologic units within which vertebrate fossils or significant invertebrate fossils have been determined by previous studies to be present or are likely to be present. These units include, but are not limited to, sedimentary formations that contain significant paleontological resources anywhere within their geographical extent as well as sedimentary rock units temporally or lithologically amenable to the preservation of fossils.

A geologic formation is defined as a stratigraphic unit identified by its lithic characteristics (e.g., grain size, texture, color, and mineral content) and stratigraphic position. There is a direct relationship between fossils and the geologic formations within which they are enclosed, and with sufficient knowledge of the geology and stratigraphy of a particular area, it is possible for paleontologists to reasonably determine its potential to contain significant nonrenewable vertebrate, invertebrate, marine, or plant fossil remains.

The paleontological sensitivity for a geologic formation is determined by the potential for that formation to produce significant nonrenewable fossils. This determination is based on what fossil resources the particular geologic formation has produced in the past at other nearby locations. Determinations of paleontologic sensitivity must consider not only the potential for yielding vertebrate fossils but also the potential for a few significant fossils that may provide new and significant taxonomic, phylogenetic, and/or stratigraphic data.

The Society of Vertebrate Paleontology (1995:22-27) issued a set of standard guidelines intended to assist paleontologists to assess and mitigate any adverse effects/impacts to nonrenewable paleontological resources. The Society defined three potential categories of paleontological sensitivity for geologic units that might be impacted by a proposed project. These categories are described below, along with the criteria used to establish their sensitivity.

- **High sensitivity**: Geologic units assigned to this category are considered to have a high potential for significant nonrenewable vertebrate, invertebrate, marine, or plant fossils. Sedimentary rock units in this category contain a relatively high density of recorded fossil localities, have produced fossil remains in the vicinity, and are very likely to yield additional fossil remains.
- **Low sensitivity**: Geologic units are assigned to this category when they have produced no or few recorded fossil localities and are not likely to yield any significant nonrenewable fossil remains.
- **Undetermined sensitivity**: Geologic units are assigned to this category when there is limited exposure of the rock units in the area and/or the rock units have been poorly studied.

ENVIRONMENTAL SETTING

GEOLOGIC SETTING

The project area lies in the northern portion of the Peninsular Ranges province, which is bounded on the north by the Transverse Ranges province, on the northeast by the Colorado Desert province, and on the west by the Pacific Ocean (Jenkins 1980:40-41; Harms 1996:150). The Peninsular Ranges province extends southward to the southern tip of Baja California (Jahns 1954).

Geographically, the project area belongs to the southeastern portion of the San Jacinto Valley, a southeast-northwest trending valley situated below the western slopes of the San Jacinto Mountains. More specifically, the project area is located approximately three miles southwest of the San Jacinto River and the foot of the San Jacinto Mountains, and a half-mile west of Park Hill, which contains an outcropping of Plio-Pleistocene-age sedimentary rocks (Dibblee 2003).

The San Jacinto Valley one of several tectonically controlled valleys in the valley-and-ridge systems within the Perris Structural Block (English 1926). These structurally depressed troughs are filled with sediments of upper Pliocene through Recent age (Mann 1955:Plate 1; Kennedy 1977:5), and the ridges are composed of plutonic igneous rocks, metasedimentary rocks, and late-stage intrusive dikes.

The Perris Structural Block was defined by English (1926) as a region between the San Jacinto and Elsinore-Chino fault zones. It is bounded on the north by the Cucamonga (San Gabriel) Fault and on the south by a vaguely delineated boundary near the southern end of the Temecula Valley (*ibid.*). This structural block is considered to have been active since Pliocene times (Woodford et al. 1971:3421).

CURRENT NATURAL SETTING

The four proposed pipeline segments comprising the project area are mostly situated in the southwestern portion of the City of San Jacinto, with a portion of Line C extending across fields on the northern edge of the City of Hemet. The project area as a whole lies in an area of mixed residential and commercial uses, generally bounded by Esplanade Avenue on the north, San Jacinto Avenue on the east, Menlo Avenue on the south, and Buena Vista Avenue on the west. The open field portions of the project area are located west of Santa Fe Avenue and near the intersection of San Jacinto Avenue and Menlo Avenue. Both of these areas have been disked in the recent past, although some pockets of dense vegetation were observed in the field west of Santa Fe Avenue (Fig. 3).

The climate and environment of the surrounding area are typical of southern California's inland valleys, with temperatures in the region reaching over 100 degrees in summer and dipping to near freezing in winter. Elevations along the project route range between 1,550 and 1,600 feet above mean sea level, with a gradual incline to the south. Vegetation in and near the project area included eucalyptus and pepper trees, mustard, foxtails, oleanders tumbleweeds, sunflowers, various small grasses and shrubs and, along the paved roads, introduced landscaping plants. Surface soils consist of a sandy loam typical of the San Jacinto Valley.

Figure 3. Typical landscapes in the project area. *Clockwise from upper left*: an open field where Line C will cross (view to the north); along the proposed alignment of C-5 (view to the west); C-4 from the intersection of Midway Street and Santa Fe Avenue (view to the south); and Line B from the intersection of Midway Street and San Jacinto Avenue (view to the south). (Photographs taken on June 18, 2012)

METHODS AND PROCEDURES

RECORDS SEARCHES

The records search service was provided by the San Bernardino County Museum (SBCM) in Redlands and the Natural History Museum of Los Angeles County (NHMLAC) in Los Angeles. These institutions maintain files of regional paleontological localities as well as supporting maps and documents. The records search results were used to identify known paleontological localities in or near the project area, or in the general vicinity.

LITERATURE REVIEW

In addition to the records searches, a literature search was conducted using materials in the CRM TECH library, including unpublished reports produced during surveys of other properties in the area, and the personal library of CRM TECH geologist/paleontologist Harry M. Quinn, California Professional Geologist #3477 (see App. 1 for qualifications).

FIELD SURVEY

On June 18, 2012, CRM TECH paleontological surveyors Daniel Ballester (see App. 1 for qualifications) conducted the field survey of the project area under the direction of Harry M. Quinn. Where the proposed pipeline alignments are confined within the heavily

disturbed rights-of-way of existing public roadways, the survey was conducted at a reconnaissance level by driving along the project route and visually inspecting the surrounding ground surface for any indications of potential paleontological resources. Areas outside the existing roadways were surveyed at an intensive level by walking two parallel transects placed 15 meters (approx. 50 feet) to either side of the project centerline.

Using these methods, the ground surface in the entire project area was systematically and carefully examined to determine the soil types, to verify the geological formations, and to look for any indications of paleontological remains. Visibility of the native ground surface was virtually zero where the project area lies under road pavement, and varied from fair to good (50-75%) in the open fields, depending on the density of the vegetation.

RESULTS AND FINDINGS

RECORDS SEARCHES

The records searches by the NHMLAC and the SBCM revealed no known paleontological localities within the project area or within a one-mile radius (McLeod 2012; Scott 2012; see App. 2). The NHMLAC identified the surface deposits in the project area as younger and older Quaternary fan deposits with some fluvial deposits, but also notes that the area immediately east of San Jacinto Avenue includes exposures of Pleistocene-age Bautista Bed formations, on Park Hill and the adjacent terrain (McLeod 2012).

While the surficial sedimentary deposits typically do not contain significant fossil remains within the uppermost layers, the NHMLAC states that the older Quaternary deposits they may overlie could contain significant vertebrate fossil remains (McLeod 2012). The NHMLAC recommends paleontological monitoring for Pleistocene-age sediments, should any be encountered, but not for the surface sediments of Recent age (*ibid.*)

The SBCM finds the project area to be situated upon Pleistocene-age alluvial fan deposits overlain by Holocene alluvium (Scott 2012). While the Holocene alluvium is known to have a low paleontological sensitivity, the Pleistocene fan deposits may have a high potential to contain paleontological resources, as demonstrated by the discovery of fossil remains of extinct animals from the Ice Age elsewhere in the region (*ibid.*). Scott (2012) points out that it is not known at what depths such fossil-bearing sediments might be encountered, but it is expected that Pleistocene-age sediments may well be encountered during excavations in excess of five feet below the existing ground surface.

LITERATURE REVIEW

Dudley (1935:Geologic Map) mapped the surface geology at the project location as entirely alluvium of Quaternary age. Jahns (1954:Plate 3) mapped it as *Qal*, namely "alluvium; alluvial-fans, flood-plain, swamp, lake, and sand dune" of Recent age. Fraser (1931:Geologic Map) mapped the eastern portion of the project area as *Qal,* or alluvium of Quaternary age, mainly Recent.

Likewise, Rogers (1965) mapped the surface geology as *Qal,* alluvium of Recent (Holocene) age, the same material he mapped for the surface sediments in the Domenigoni Valley,

several miles to the south, where many vertebrate fossil remains were found (Springer and Scott 1994:47A; Springer et al. 1998; Springer et al. 1999). Many of those fossil remains, however, were discovered as a result of the deep excavations required for reservoir and dam constructions at that location.

Dibblee (2003) mapped the surface geology at this location as mainly *Qa*, or alluvial sediments of Holocene age. He shows the *Qa* to rest directly atop the Pleistocene-age *Qoa* with variable thickness throughout the region (*ibid*.). Dibblee also mapped some *QTs* at Park Hill, extending northwest to a point just east of the project area, near San Jacinto Avenue. The *QTs* is shown to be sedimentary rocks of the Bautista Beds of Plio-Pleistocene age.

Dibblee (2003) shows the Casa Loma Fault that uplifts Park Hill as crossing the project area at three points along the proposed pipeline alignment. Although the Casa Loma Fault is considered a strike-slip fault, it has some dip-slip movement. Since this fault appears to be uplifted on the northeastern side and down dropped on the southwestern side, the depth to the older subsurface rocks will be influenced by the fault, as the older rocks should be found closer to the surface northeast of the fault and deeper southwest of the fault.

Knecht (1971:Map Sheet 101) mapped the surface soils in the project area as *GtA*, *SeA*, *SeD2*, *SgA*, and *SgC*. The *GtA* soils belong to the Grangeville Series, which develop on alluvial fans and flood plains, while the other soil types develop in alluvium formed from weakly consolidated sedimentary formations, in this case possibly the *QTs*.

FIELD SURVEY

The field survey produced negative results for any indication of paleontological resources, and no surficial evidence of fossil remains or potentially fossiliferous sediments were encountered. The surface soils within most of the project area have been disturbed in the past by disking and various construction activities, including those associated with the existing roads. Therefore, no intact paleontological deposits are likely to survive in the surface soils, and none were observed.

DISCUSSION

Based on the research results outlined above, the project area lies mainly upon alluvial fan deposits of Holocene age, which have a low potential for containing any nonrenewable fossils. However, these sediments rest directly atop older sediments of Pleistocene age at some variable depth. Additionally, the project area is northwest of Park Hill, near a location where an exposure of Plio-Pleistocene-age rocks has been uplifted on the northeastern side of the Casa Loma Fault. These older Pleistocene-age deposits are known to be sensitive for paleontological resources, and are given a high potential for containing nonrenewable fossil remains.

Any further paleontological investigations will need to focus on the undisturbed Pleistocene-age sediments at depth. Geotechnical boring logs, if available, may reveal the thickness of the younger surface sediments. If no boring logs are available or if the logs do no show a definitive break in the stratigraphy, periodic field inspections will be necessary

during the project to determine the depth at which the older Pleistocene-age sediments will be encountered.

Most of the ground surface in the project area has been disked or disturbed by construction activities in the past. Because of the disturbances, generally speaking, the top two to three feet of soils would not contain any intact fossil remains. In the portions of the project area along existing roadways, the upper three to five feet of sediments may have been disturbed. However, should any of the excavations encounter the older sediments, they should be considered highly sensitive for paleontologucal resources.

CONCLUSION AND RECOMMENDATIONS

CEQA guidelines (Title 14 CCR App. G, Sec. V(c)) require that public agencies in the State of California determine whether a proposed project would "directly or indirectly destroy a unique paleontological resource" during the environmental review process. 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.

As stated above, the proposed project's potential to impact paleontological resources appears to range from low to high, depending on the soils impacted. The disturbed surface and near-surface soils, mainly Holocene in origin, are considered to be low in sensitivity for intact fossil resources, and will not require further paleontological investigations. The undisturbed Pleistocene-age sediments at depth, however, are of high paleontological sensitivity. If the depth at which the undisturbed Pleistocene-age sediments will be encountered—i.e., the thickness of Recent surfacial alluvium—cannot be determined through existing data, such as boring logs, periodic monitoring, or "spot-checks," will be necessary during excavations and other earth-moving activities.

The locations and depths at which to check for buried Pleistocene-age sediments are determined by the mapped location of the Casa Loma Fault across the project area (Fig. 4). The portion of the project area southwest of the fault should be checked once excavations reach a depth of 10 feet, the portion northeast of the fault and west of Santa Fe Avenue should be checked beyond a depth of five feet, and the portion along Midway Street and San Jacinto Avenue and northeast of the fault should be checked periodically from the commencement of the earth-moving operations.

Once undisturbed Pleistocene-age sediments are encountered in any portion of the project area, continuous monitoring will become necessary, along with a program to mitigate impacts to any paleontological resources that may be unearthed. The mitigation program should be developed in accordance with the provisions of CEQA as well as with regulations currently implemented by the County of Riverside and the proposed guidelines of the Society of Vertebrate Paleontology. It should include, but not be limited to the following:

1. The excavation of areas identified as likely to contain paleontologic resources, such as any undisturbed subsurface older alluvium, should be monitored by a qualified

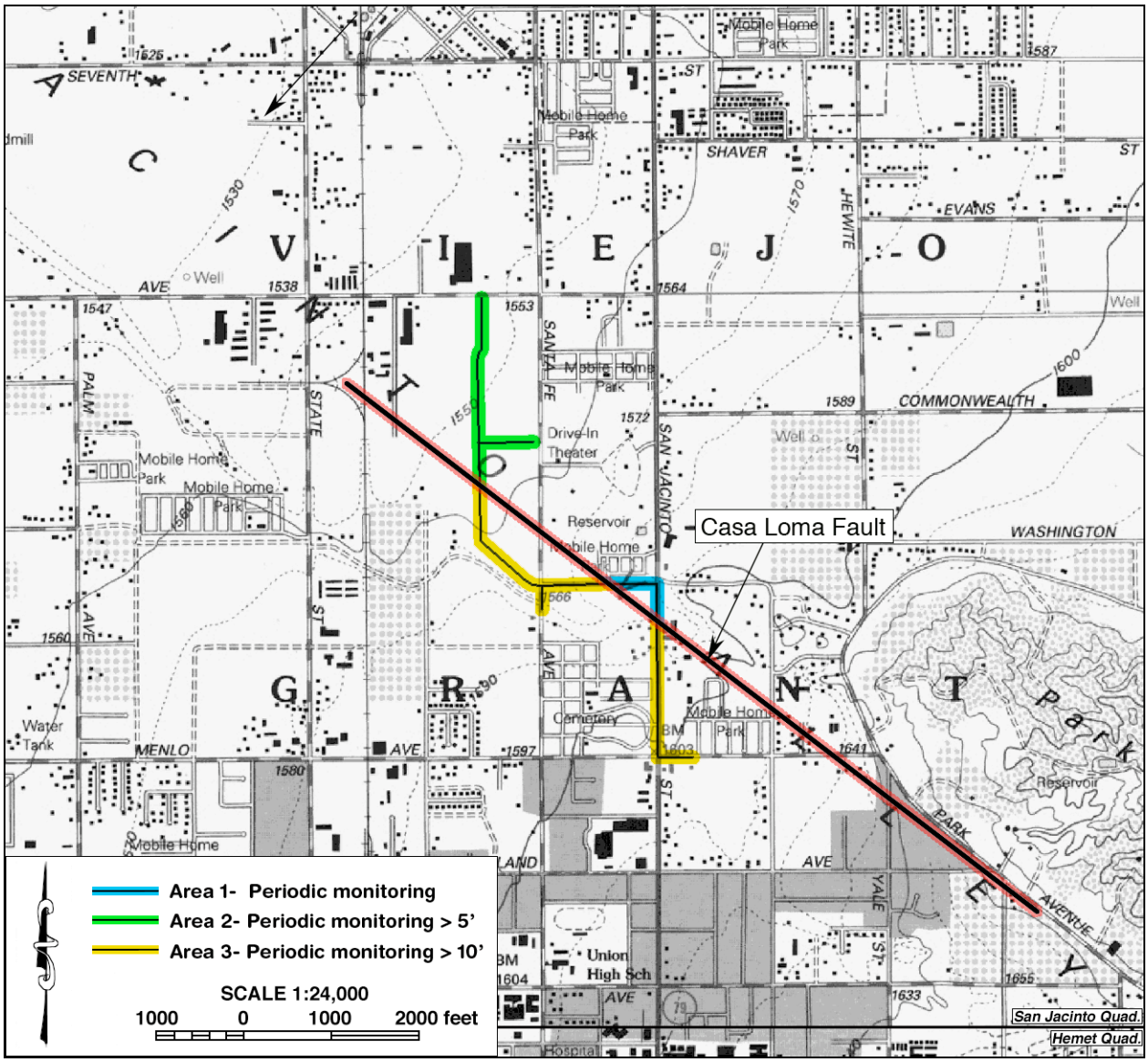

Figure 4. Recommendations for periodic monitoring.

paleontological monitor. The monitor should be prepared to quickly salvage fossils, if they are unearthed, to avoid construction delays, but must have the power to temporarily halt or divert construction equipment to allow for removal of abundant or large specimens.

2. Samples of sediments should be collected and washed to recover small invertebrate and vertebrate fossils.
3. Recovered specimens should be identified and curated at a repository with permanent retrievable storage that would allow for further research in the future.
4. A report of findings, including, when appropriate, an itemized inventory of recovered specimens and a discussion of their significance, should be prepared upon completion of the steps outlined above. The report and inventory, when submitted to the appropriate lead agency, would signify completion of the program to mitigate impacts on paleontologic resources.

CERTIFICATION: I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this paleontological report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

DATE: July 17, 2012

SIGNED: Harry M. Quinn

Print Name: Harry M. Quinn

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APPENDIX 1

PERSONNEL QUALIFICATIONS

PROJECT GEOLOGIST/PALEONTOLOGIST
Harry M. Quinn, M.S., California Professional Geologist #3477

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 North Palm Springs, 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- Project Paleontologist, CRM TECH, Riverside/Colton, California.
l998- Project Archaeologist, CRM TECH, Riverside/Colton, 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.
1965-1978 Exploration and Development Geologist, Texaco, Inc., Los Angeles, California.

Previous Work Experience in Paleontology

1969-1973 Attended Texaco company-wide seminars designed to acquaint all paleontological laboratories with the capability of one another and the procedures of mutual assistance in solving correlation and paleo-environmental reconstruction problems.
1967-1968 Attended Texaco seminars on Carboniferous coral zonation techniques and Carboniferous smaller foraminifera zonation techniques for Alaska and Nevada.
1966-1972, 1974, 1975 Conducted stratigraphic section measuring and field paleontological identification in Alaska for stratigraphic controls. Pursued more detailed fossil identification in the paleontological laboratory to establish closer stratigraphic controls, mainly with Paleozoic and Mesozoic rocks and some Tertiary rocks, including both megafossil and microfossil identification, as well as fossil plant identification.
1965 Conducted stratigraphic section measuring and field paleontological identification in Nevada for stratigraphic controls. Pursued more detailed fossil identification in the paleontological laboratory to establish closer stratigraphic controls, mainly with Paleozoic rocks and some Mesozoic and Tertiary rocks. The Tertiary work included identification of ostracods from the Humboldt and Sheep Pass Formations and vertebrate and plant remains from Miocene alluvial sediments.

Memberships

Society of Vertebrate Paleontology; American Association of Petroleum Geologists; Canadian Society of Petroleum Geologists; Rocky Mountain Association of Geologists, Pacific Section; Society of Economic Paleontologists and Mineralogists; San Bernardino County Museum.

Publications in Geology

Five publications in Geology concerning an oil field study, a ground water and earthquake study, a report on the geology of the Santa Rosa Mountain area, and papers on vertebrate and invertebrate Holocene Lake Cahuilla faunas.

PALEONTOLOGICAL SURVEYOR/FIELD DIRECTOR
Daniel Ballester, B.A.

Education

1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.

- Cross-trained in paleontological field procedures and identifications by CRM TECH Geologist/Paleontologist Harry M. Quinn.

Professional Experience

2002- Field Director, CRM TECH, Riverside/Colton, California.
- Report writing, site record preparation, and supervisory responsibilities over all aspects of fieldwork and field crew.

1999-2002 Project Archaeologist/Field Paleontologist, CRM TECH, Riverside, California.
- Survey, testing, data recovery, monitoring, and mapping.

1998-1999 Field Crew, K.E.A. Environmental, San Diego, California.
- Two and a half months of excavations on Topomai village site, Marine Corp Air Station, Camp Pendleton.

1998 Field Crew, A.S.M. Affiliates, Encinitas, California.
- Two weeks of excavations on a site on Red Beach, Camp Pendleton, and two weeks of survey in Camp Pendleton, Otay Mesa, and Encinitas.

1998 Field Crew, Archaeological Research Unit, University of California, Riverside.
- Two weeks of survey in Anza Borrego Desert State Park and Eureka Valley, Death Valley National Park.

REPORT WRITER
Terri Jacquemain, M.A.

Education

2004 M.A., Public History and Historic Resource Management, University of California, Riverside.
- M.A. thesis: Managing Cultural Outreach, Public Affairs and Tribal Policies of the Cabazon Band of Mission Indians, Indio, California; internship served as interim Public Information Officer, Cabazon Band of Mission Indians, June-October, 2002.

2002 B.S., Anthropology, University of California, Riverside.
2001 Archaeological Field School, University of California, Riverside.
1991 A.A., Riverside Community College, Norco Campus.

Professional Experience

2003- Historian/Architectural Historian/Report Writer, CRM TECH, Riverside/Colton, California.
- Author/co-author of legally defensible cultural resources reports for CEQA and NHPA Section 106;
- Historic context development, historical/archival research, oral historical interviews, consultation with local communities and historical organizations;
- Historic building surveys and recordation, research in architectural history; architectural description

2002-2003 Teaching Assistant, Religious Studies Department, University of California, Riverside.
2002 Interim Public Information Officer, Cabazon Band of Mission Indians.
2000 Administrative Assistant, Native American Student Programs, University of California, Riverside.
1997-2000 Reporter, *Inland Valley Daily Bulletin*, Ontario, California.
1991-1997 Reporter, *The Press-Enterprise*, Riverside, California.

Membership

California Preservation Foundation.

APPENDIX 2

RECORDS SEARCHES RESULTS

SAN BERNARDINO COUNTY MUSEUM

COUNTY OF SAN BERNARDINO

2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462

ROBERT L. McKERNAN
Director

22 June 2012

CRM Tech
attn: Nina Gallardo
1016 E. Cooley Drive, Suite "B"
Colton, CA 92324

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, SAN JACINTO MASTER DRAINAGE PLAN, LINE "C", RIVERSIDE COUNTY, CALIFORNIA**

Dear Ms. Gallardo,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named linear project in the San Jacinto region of Riverside County, California. The study corridor traverses portions of sections 2 (projected) and 3 (projected), Township 5 South, Range 1 West, San Bernardino Base and Meridian, as seen on the San Jacinto, California 7.5' United States Geological Survey topographic quadrangle map (1953 edition, photorevised 1979).

Previous geologic mapping (Rogers, 1965) indicates that the proposed project property is situated entirely upon Holocene alluvium. This alluvium is likely too young to contain significant nonrenewable paleontologic resources, and so is assigned low paleontologic sensitivity. However, this Holocene alluvium forms a thin sedimentary veneer overlying subsurface sediments of Pleistocene age. This subsurface Pleistocene older alluvium has high potential to contain significant fossil resources, and so is assigned high paleontologic sensitivity. Elsewhere throughout Riverside and inland San Bernardino Counties, Pleistocene valley sediments have frequently yielded significant fossils of extinct animals and plants from the "Ice Ages" (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, short-faced bears, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). For this reason, these Pleistocene sediments can be confidently interpreted to have high paleontologic sensitivity. However, it is not know *a priori* at what depths such Pleistocene sediments might be encountered; for the purposes of this report, it is inferred that such sediments may be present at depths in excess of 5' below the existing ground surface.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI). The

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results of this search indicate that no paleontologic resource localities are recorded from within the boundaries of the proposed project property, nor for at least one mile in any direction.

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in conjunction with development may have high potential to adversely impact significant nonrenewable paleontologic resources present within the boundaries of the proposed project corridor, depending upon the proposed depth of excavation. If excavation is restricted to depths of approximately 5' below the existing ground surface, or less, then older Pleistocene sediments are not expected to be encountered. At these depths, no program to mitigate adverse impacts to paleontologic resources is recommended at this time.

In the event that excavation is expected to exceed 5' below the existing ground surface in depth, or if fossil-bearing sediments are encountered at any depth, a qualified vertebrate paleontologist must be retained to develop a program to mitigate impacts to such resources. This mitigation program should be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside. This program should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. Based upon the results of this review, areas of concern include any and all previously-undisturbed sediments of Pleistocene older alluvium present at depth within the boundaries of the property. Paleontologic monitors should be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens.

   As discussed above, monitoring is not necessary unless excavation is expected to extend below depths of 5' below the existing ground surface, or if fossils and/or potentially-fossiliferous units are encountered and determined upon exposure and examination by qualified paleontologic personnel to have potential to contain fossil resources. If the potentially-fossiliferous units described herein are present in the subsurface, but are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources, monitoring is not necessary.

2. Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).

3. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage (e.g., SBCM). These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not complete until such curation into an established museum repository has been fully completed and documented.

4. Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, would signify completion of the program to mitigate impacts to paleontologic resources.

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Jefferson, G.T., 1991. A catalogue of late Quaternary vertebrates from California: Part Two, mammals. Natural History Museum of Los Angeles County Technical Reports, No. 7.

Reynolds, S.F.B. and R.L. Reynolds, 1991. The Pleistocene beneath our feet: near-surface Pleistocene fossils in inland southern California basins. *In* M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler (eds.), Inland Southern California: the last 70 million years. Redlands: San Bernardino County Museum Special Publication 38(3&4), p. 41-43.

Rogers, T.H., 1965. Geologic map of California, Santa Ana sheet, scale 1:250,000. California Division of Mines and Geology Regional Geologic Map Series.

Scott, E., 2010. Extinctions, scenarios, and assumptions: changes in latest Pleistocene large herbivore abundance and distribution in western North America. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: Papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 225-239.

Scott, E. and S.M. Cox, 2008. Late Pleistocene distribution of Bison (Mammalia; Artiodactyla) in the Mojave Desert of southern California and Nevada. *In* X Wang and L.G. Barnes (eds.), Geology and Vertebrate Paleontology of Western and Southern North America, Contributions in Honor of David P. Whistler. Natural History Museum of Los Angeles County Science Series No. 41, p. 359 - 382.

Scott, E. and K. Springer, 2003. CEQA and fossil preservation in southern California. The Environmental Monitor, Fall 2003, p. 4-10, 17.

Scott, E., K. Springer and J.C. Sagebiel, 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of "follow-through" in preserving paleontologic resources. *In* M.W. Allen and J. Reed (eds.) The human journey and ancient life in California's deserts: Proceedings from the 2001 Millennium Conference. Ridgecrest: Maturango Museum Publication No. 15, p. 65-70.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2009. The Diamond Valley Lake local fauna: late Pleistocene vertebrates from inland southern California. *In* L.B. Albright III (ed.), Papers on geology, vertebrate paleontology, and biostratigraphy in honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin 65:217-235.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2010. Late Pleistocene large mammal faunal dynamics from inland southern California: the Diamond Valley Lake local fauna. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 256-265.

Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325
Fax: (213) 746-7431
e-mail: smcleod@nhm.org

6 July 2012

CRM Tech
1016 East Cooley Drive, Suite B
Colton, CA 92324

Attn: Nina Gallardo

re: Paleontological resources for the proposed San Jacinto Master Drainage Plan, Line C Project, CRM Tech # 2618 P (San Jacinto Line C) Paleo, in the City of San Jacinto, Riverside County, project area½)

Dear Nina:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed San Jacinto Master Drainage Plan, Line C Project, CRM Tech # 2618 P (San Jacinto Line C) Paleo, in the City of San Jacinto, Riverside County, project area as outlined on the portion of the San Jacinto USGS topographic quadrangle map that you sent to me via e-mail on 6 June 2012. We do not have any vertebrate fossil localities that lie directly within the proposed project boundaries, but we do have a locality somewhat nearby that occurs in sedimentary deposits similar to those that may occur subsurface in the proposed project area.

Surface deposits in almost the entire proposed project area consist of soil and younger Quaternary Alluvium, derived primarily as fan deposits from the San Jacinto Mountains to the east and the Lakeview Mountains to the west, but also somewhat as fluvial deposits from the various drainages in the area, most especially the San Jacinto River adjacent to the northeast. These types of deposits typically do not produce significant vertebrate fossils, at least in the uppermost layers, and we have no vertebrate fossil localities anywhere nearby from these deposits. Immediately east of the proposed project area east of San Jacinto Street there are

exposures of the Pleistocene Bautista Beds on Park Hill and the adjacent terrain. These Bautista Beds may also occur at relatively shallow depth in the proposed project area. Our closest fossil vertebrate localities from the Bautista Beds are LACM 1107 and 1715, southeast of the proposed project area above Bautista Creek and South Fork of the San Jacinto River respectively, that produced fossil specimens of horse, *Equus bautistensis*.

Surface grading or shallow excavations in the surficial younger Quaternary Alluvium in the proposed project area probably will not encounter any significant vertebrate fossils. Deeper excavations that extend into the underlying older Quaternary deposits, including the Bautista Beds, however, may well uncover significant vertebrate fossil remains. Any substantial excavations below the uppermost layers, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice