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December 19, 2013 (Revised January 10, 2014)
Project No. 04.62130155

Sturgeon Services International
3120 Sturgeon Street
Bakersfield, California, 93308

Attention: Mr. Keith Kidwell Jr.

Subject Preliminary Geologic Hazards Evaluation, East Cat Canyon Oil Field, Sisquoc Area, Santa Barbara County, California

Dear Mr. Kidwell:

This letter-report provides the results of our preliminary geologic hazards assessment of the East Cat Canyon Oil Field located in the Sisquoc area of Santa Barbara County, California. Our services were performed in general accordance with our proposal dated October 22, 2013. Authorization for our work was provided by Sturgeon Services International's (SSI) Purchase Order with Fugro and by SSI's Letter Agreement Request/Proposal with AERA Energy (AERA) dated October 23, 2013. This report provides our preliminary assessment of the geologic hazards in the study area. Our services for the project also consisted of performing a Phase I preliminary geotechnical engineering study for the East Cat Canyon Oil Field and the findings and results of that study are provided under a separate cover.

INTRODUCTION AND PROJECT DESCRIPTION

Proposed Project

We understand that our assessment will be used to support Front End Load Engineering and Design work for potential oil and gas development in the lease areas owned by Aera Energy, LLC (Aera) in the East Cat Canyon Oil Field. Potential development work in the oil field is expected to involve the following elements:

- Well pads and access roads,
- Pipelines,
- Office area,
- Central processing plant and warehouse, and
- Steam Generator.

Actual locations of the proposed facilities have not been determined. However, preliminary sites for the new office, processing plant and steam generator have been selected and were shown on a map provided to us via email. Access to the site is from Palmer Road and Cat Canyon Road.

Site Description

The proposed oil field development area consists of eight lease areas located within Sections 19, 20, 28, 29, 31, and 32 of Township 9N/Range 32W, SBBM. The lease areas are shown on Plate 1 - Location Map - East Cat Canyon Area. That map also shows the extent of development in the area (roads, oil-well access roads and pads, the location of residential homes, industrial developments, very limited agricultural development, and drainage catchments.

The topography of the area consists of a series of north-south aligned subdued hills with elevations ranging from about +500 to +1,000 feet above mean sea level (MSL). Cat Canyon Creek, which is the principal stream in the area, is intermittent and flows to the north toward the community of Sisquoc. That creek, as well as those in Long Canyon and Olivera Canyon, is well entrenched along most of its course.

Work Performed

The scope of work for this preliminary geologic hazards study included the review of readily available published geologic maps for the study area (Woodring and Bramlette, 1950; Muir, 1964; Dibblee, 1994). We also obtained detailed (1:6,200) stereo-pair digital aerial photographs for the project study area (dated 04/16/11) from Central Coast Aerial Mapping and an electronic version of the site topographic base map (with 2-foot-contours). We used the published geologic maps and the stereo aerial photographs to prepare a preliminary geologic map of the study area at a scale of 1”=400’. That geologic map shows generalized geologic units, bedding orientations, and landslides.

After preparing the preliminary geologic map, we coordinated with SSI staff to schedule a two-day reconnaissance visit to the project site. The purpose of the reconnaissance visit was to observe geologic exposures, and supplement and update the preliminary geologic mapping and characterization work developed from our data review. We also reviewed the site conditions and made observations relative to land use and selected locations for preliminary soil borings for our preliminary geotechnical engineering evaluation study. Data gathered from our data review and site reconnaissance were used to evaluate and characterize potential geologic hazards that should be considered in the planning and preliminary design of proposed improvements at the East Cat Canyon Oil Field.

General Geologic Setting

The regional geologic conditions in the East Cat Canyon Oil Field area have been studied by others including Woodring and Bramlette (1950), Muir (1964); and Dibblee (1994). Plate 2 – Regional Geologic Map presents the regional geologic conditions as mapped by Dibblee (1994). As part of our work scope, we compiled a more detailed geologic map of the East Cat Canyon Oil Field using data from the referenced past researchers, data acquired from our review of selected aerial photographs, and observations made during our site reconnaissance. The results of our more detailed site-specific geologic mapping effort are shown on Plate 3 – Geologic Map. As illustrated on Plate 2, the project area contains a predominantly flat lying to slightly folded sequence of Pliocene and Pleistocene formations, which are unconformably underlain by structurally deformed and folded Miocene and older formations. The approximate locations of two anticlinal axes are shown on Plate 3, one near the southern margin of the area and one near

the northeastern margin. The subsurface formations and stratigraphic relationships are shown on Plate 2 in a south to north structural cross section (C-D) that accompanies the Dibblee geologic map of the area. In the study area, only the Plio-Pleistocene units are exposed and they include, from oldest to youngest, the Careaga and Paso Robles Formations.

The Careaga Formation is the oldest (Pliocene age) geologic unit exposed in the project area and it crops out as a linear band along the southerly edge of Field Fee and R & G lease area as shown on Plates 2 and 3. In that area, the Careaga Formation is divided into two members; the Cebada and the Graciosa Members. The Cebada fine-grained lower member consists primarily of very uniform fine-grained to very-fine-grained massive sandstone, which is light gray to yellow in color. Small stringers of shale pebbles and fossils are abundant. Fugro (2012) reports that the Cebada member attains a maximum thickness about 250 feet, and thins to the north in the subsurface. The upper member of the Careaga Formation is referred to as the Graciosa Member and in the project area commonly consists of coarse-grained sandstone with thin stringers of gravel. That member attains a maximum thickness of about 100 feet in the southerly part of the project area and thins out to zero thickness to the northeast (Fugro, 2012).

The Pleistocene-age Paso Robles Formation crops out in most of the project area and conformably overlies the Careaga Formation. The Paso Robles Formation is gently folded (with dips less than about 10 degrees) and is over 500 feet thick in the project area. The Paso Robles Formation is non-marine and primarily consists of poorly consolidated stream-deposited lenticular beds of gravel, sand, silt, and clay. The formation is exposed in numerous cut slopes throughout the study area and consists of very poorly sorted and heterogeneous (i.e., a wide range of grain size materials) mixtures of cobbles, gravel, and sand in a clay matrix.

Older alluvial deposits are present on the tops of ridges and hills between Cat Canyon Road, Long Canyon Road, and Olivera Canyon Road. Those deposits are of late Pleistocene age and primarily consist of mixtures of gravel, sand, and silt. In many locations, the older alluvial deposits are well cemented.

Deposits of Recent colluvium and alluvium are also present in the project area in the tributary canyons and valley floors. The colluvium and alluvium deposits generally consist primarily of poorly sorted mixtures of sand and gravel with some fine-grained materials. The thickness of those deposits likely vary from relatively limited (less than about 10 feet) in slope areas and minor drainage swales to greater than about 30 to 50 feet in more significant drainage and collection areas.

Throughout the oil field area, local deposits of artificial fill are present. Those fill materials were commonly placed to facilitate the construction of drilling and production pads, and access roads. Where recognized, the approximate distributions of some of the more significant of those fills are shown on Plate 3, but it is likely that not all of the fill materials have been detected or are shown on that map. The fill deposits appear to consist of locally derived earth materials that were typically placed in an uncompacted state. In some locations, the fill materials appear to contain concrete and other construction debris.

Groundwater was not encountered in the site-specific geotechnical drill holes excavated to depths of up to 30 feet and performed as part of our preliminary geotechnical engineering evaluation study. In addition, data reported in Fugro (2012) suggests the depth to groundwater

within the study area is anticipated to be greater than 100 to 200 feet below the ground surface. Although the depth to groundwater is anticipated to be relatively deep, there is a possibility for areas or zones of perched groundwater to be present at shallow depths (that is less than 30 feet deep) on at least a seasonal basis. Perched groundwater can occur in drainage channels or where changes in soil type or permeability occur within soil or rock materials. Groundwater seepage can occur where perched water daylights in cuts or at the ground surface.

Seismic Setting

No active faults have been mapped by others within the project boundaries and no faults were observed on the site during our reconnaissance surface mapping. However, two concealed older faults have been mapped through the project area (Plate 3) on the basis of published oil exploration data (California D.O.G., 1961; 1974; Hall, 1981; and Lettis et al., 2004).

The concealed northeast-dipping, normal fault mapped through the northeastern portion of the project area is referred to as the Garey fault (Hall, 1981). The concealed northeast-dipping, normal fault mapped through the southwestern portion of the area is unnamed on published maps (California D.O.G., 1974), but locally referred to as the Fuglar fault. A cross-section of the Olivera Canyon Area of the Cat Canyon oil field (California D.O.G., 1961) shows that the Garey fault only cuts rocks older than early Pliocene, therefore that fault would not be considered active. A cross-section of the East Area of the Cat Canyon oil field (California D.O.G., 1961) shows a similar pre-early Pliocene age for the Fuglar fault through the southwestern area, but California D.O.G. (1974) suggests that additional faulting (with a different sense of slip) may extend upward into the base of the Carreaga Formation rocks of late Pliocene age. In either case, the Fuglar fault would not be considered active. Consequently, neither of those two onsite faults are considered likely to pose a ground-surface fault-rupture hazard.

The site is located in California's seismically active central coast region and there are a number of active faults in the region that have the potential to produce strong ground motion at the site. Regional faults in the study area are shown on Plate 4 - Regional Fault Map. A list of those faults within about 50 miles of the area, along with selected fault parameters, is presented in Table 1.

Table 1. Seismogenic Fault Sources

Fault Name	Fault Type	Distance (miles)	Magnitude
San Luis Range	Reverse	3	7.2
Casmalia (Orcutt Frontal)	Reverse	5	6.7
Los Alamos – West Baseline	Thrust	5	6.9
Lions Head	Reverse	8	6.8
Santa Ynez	Strike Slip	21	7.2
Los Osos	Reverse	23	7.0
Hosgri	Strike Slip	26	7.3
San Juan	Strike Slip	29	7.1
Red Mountain	Reverse	31	7.4
Mission Ridge – Arroyo Parida – Santa Ana	Reverse	35	6.9
North Channel	Thrust	36	6.8
Rinconada	Strike Slip	36	7.5
Pitas Point	Reverse	37	7.3
San Andreas	Strike Slip	40	8.1
Santa Ynez (East)	Strike Slip	43	7.2

The peak ground accelerations with a 475-year and a 2,475-year return period were estimated for a location near the south central boundary of the area shown on Plate 3 (latitude: 34.8237, longitude: -120.2895) using the U.S. Geological Survey's 2008 Interactive Deagggregations web site. Those values, assuming the site conditions are represented by a $Vs_{(30)}$ of about 400 m/sec, are listed in Table 2 below.

Table 2. Preliminary Probabilistic Ground Motions

Return Period	Peak Ground Acceleration (g)
475 years	0.26
2,475 years	0.49

The design motion parameters for use with the 2013 California Building Code were estimated using the U.S. Geological Survey's Seismic Design Maps & Tools website. Table 3 summarizes those parameters estimated for a location near the south central boundary of the area shown on Plate 3 (latitude: 34.8237, longitude: -120.2895). Based on our reconnaissance-level effort, the geologic site conditions could potentially meet the criteria for either Site Class C or D conditions and code-based seismic criteria are provided in Table 3 for both Site Class C and D conditions.

Table 3. Preliminary Building Code Seismic Design Parameter

2010 Building Code Seismic Parameter	Site Class C value (g)	Site Class D Value (g)
S_S	1.116	1.116
S_{MS}	1.116	1.176
S_{DS}	0.744	0.784
S_1	0.425	0.425
S_{M1}	0.585	0.670
S_{D1}	0.390	0.446

SUMMARY OF GEOLOGIC HAZARDS

Fault Rupture and Strong Ground Shaking.

Because there are no known active or potentially active faults that traverse through the subject site, the potential for ground-surface rupture due to faulting at the site is considered low to very low. The potential for strong ground shaking at the site is considered moderate, with the preliminary 475-year and 2,475-year return period ground motions estimated at about 0.26g and 0.49g, respectively.

Soil Liquefaction and Seismically Induced Settlement.

Seismically induced liquefaction is a phenomenon that commonly affects loose, granular materials below the groundwater table. Seismic shaking causes transient shear stresses in the soil deposits, which in-turn result in partial densification of the loose materials. As the saturated materials densify, pore water pressures can increase causing the effective shear strength of the soil to reduce. If pore pressures build to a significant level during or shortly after an earthquake event, the soil may begin to behave like a viscous fluid and result in lateral ground movement. In addition, pore pressure dissipation following the earthquake shaking may be accompanied by consolidation, which can cause ground settlement.

On the basis of their Plio-Pleistocene age and sampler blow count data (N-value data) obtained from our site-specific soil drill holes, the older alluvium, and Paso Robles and Carreaga Formations are not likely to be susceptible to earthquake induced liquefaction or seismic settlement.

Sampler blow count (N-value) data from our site-specific geotechnical engineering drill holes indicate the colluvial and alluvial soils could be susceptible to liquefaction. However, the depth to groundwater at the locations explored exceeded a depth of 30 feet and liquefaction is not a hazard for soils located above the groundwater level. However, if alluvial and colluvial deposits present in the canyon and valley areas are or were to become saturated, those deposits are likely to experience earthquake-induced liquefaction and settlement associated with strong ground shaking events. Site-specific geotechnical exploration and analyses will be needed to determine the potential for liquefaction and seismic settlement.

Hydroconsolidation Potential.

Hydroconsolidation (collapse) is a phenomenon whereby unconsolidated soil materials settle (collapse) upon the addition of moisture. The moisture may come from the infiltration or seepage of water from the ground surface, or from a rise in the groundwater level. Commonly, such soil materials are slightly cemented by chemical precipitates or clayey minerals, and the addition of moisture causes those cementing materials to dissolve or soften allowing the soil particles to consolidate. Often collapsible soils exhibit visible pore spaces when undisturbed samples are broken open.

Because of their age, the Paso Robles and Carreaga Formation materials and older alluvium are not likely to be subject to hydroconsolidation. However, deposits of colluvium and alluvium on the site may be susceptible hydroconsolidation.

Site-specific geotechnical exploration and analyses will be needed to determine the potential for hydroconsolidation settlement.

Subsidence Due to Fluid Withdrawal.

Because the site is located within an area of active and proposed, oil and gas extraction, there is a potential for ground-surface subsidence due to subsurface fluid withdrawal. If appropriate formation pressurization procedures are implemented during fluid extraction, the potential for ground-surface subsidence can be reduced.

Landsliding and Slope Stability.

Our geologic reconnaissance mapping of the site has identified several locations that have geomorphology that suggests the presence of past landsliding. Those mapped landslide areas that are queried on Plate 3 are more speculative than the non-queried areas. No subsurface exploration has been performed to confirm the existence of the mapped landslides shown on Plate 3. Because of the generally granular nature of the onsite materials and the gentle dips of the bedding within the Paso Robles and Carrega Formations, we suspect that most of the onsite landslides are likely to be rotational failures, as opposed to translational failures.

Throughout the area, there are numerous manmade cut slopes created to facilitate hydrocarbon production. Most of those slopes are relatively steep (1H:1V or steeper) and they commonly exhibit signs of raveling, slumping, and erosion.

Deposits of colluvium are present on the natural slopes throughout the area. Where thick deposits of colluvium were recognized, they are mapped on Plate 3 (map unit Qc). Where present on slopes, the colluvium is generally unstable and creep-prone.

If possible, areas with suspected landslide geomorphology should be avoided. However, if structures are proposed in areas of possible landsliding, subsurface exploration should be performed to confirm the presence and geometry of the landslide deposits, and to evaluate the stability of the materials. If landslide deposits are confirmed and their natural stability is found to be inadequate, removal and replacement with compacted fill, providing structural support, or compacted-fill buttressing are possible mitigation measures.

Areas of colluvium on slopes above proposed developments should be removed or supported. Because most of the earth materials on the site are generally granular and uncemented, proposed cut

slopes probably should be graded at inclinations of 2H:1V or flatter. The granular and uncemented nature of the onsite materials also increases the potential for surface erosion at the site.

Expansive Soil.

Expansive soils are clayey materials that expand when wetted. Most of the bedrock materials on the site are granular; therefore the colluvial and alluvial materials derived from them are also generally granular. Because there is likely to be a limited amount of clayey soil present on the site, the potential for highly expansive soils is limited.

Geotechnical sampling and testing should be performed to confirm the presence or absence of expansive soil materials at the site.

Petroleum Hydrocarbon Materials.

Because the site has been actively producing hydrocarbon products for decades, it is likely that hydrocarbon-contaminated soil is present locally. We also understand that oil sands were placed in several of the canyon areas on site. In addition, petroleum hydrocarbon odors were noted during drilling and sampling work in three of the six site-specific drill holes excavated as part of our preliminary geotechnical engineering evaluation study (drill holes DH-2A, DH-2B, and DH-3). Soils containing petroleum hydrocarbons or other substances common to historical oilfield development may locally be present throughout the site and should be evaluated where new construction is planned.

CONCLUSIONS

Table 4 - Geologic Hazard Screening provides a summary of our opinions regarding the potential for geologic hazards associated with the various geologic units mapped on the site.

Table 4. Geologic Hazard Screening

Hazard Potential						
Geologic Hazard	**Paso Robles & Carreaga Formations**	**Landslide Deposits**	**Alluvium**	**Colluvium**	**Older Alluvium**	**Artificial Fill**
Ground Rupture	Low to very low	Low to very low	Low to very low	Low to very low	Low to very low	Low to very low
Strong Ground Shaking	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Liquefaction	Low	Low	Moderate to High	Moderate to High	Low	Moderate
Hydroconsolidation	Low	Moderate to High	High	High	Low	High
Landsliding and Slope Stability	Moderate	High	Low	Low to Moderate	Low	High
Expansive Soils	Low	Low	Low	Low	Low	Low

Qualitative remedial measures that could be required to reduce or mitigate geologic hazards are suggested in Table 5 - Qualitative Geohazard Measures.

Table 5. Qualitative Geohazard Measures

Geologic Hazard	Possible Mitigation Measures
Ground Rupture	No Action Anticipated
Strong Ground Shaking	Design for Moderate Ground Shaking
Liquefaction	Avoid Development in Areas Susceptible to Liquefaction Excavate and Replace Materials Susceptible to Liquefaction Ground Improvement Mitigations Using Cement Deep Soil Mixing Design Foundations for Possible Downdrag Loads and Settlement
Hydroconsolidation	Excavate and Replace (or Pre-saturate) Materials Susceptible to Hydroconsolidation Ground Improvement Mitigations Using Cement Deep Soil Mixing Design Foundations for Possible Downdrag Loads and Settlement
Landsliding and Slope Stability	Avoid Development in in Landslide Prone Areas Significant Geohazard Characterization and Assessment Required for Developments Planned on or Near Mapped or Queried Landslides May Require Large-Scale Ground Stabilization Measures would likely be Costly in Landslide Areas
Expansive Soils	Design Foundations for Expansive Soil Potential as Needed

We appreciate the opportunity to work with Sturgeon Services International and AERA Energy in the planning and preliminary design effort for future improvements at the East Cat Canyon Oil Field. Please contact us if you have any questions regarding our preliminary assessment or characterization of the geohazards in the study area,

Sincerely,

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Enclosures: Plate 1 - Location Map, East Cat Canyon Area
Plate 2 - Regional Geologic Map
Plate 3 – Geologic Map
Plate 4 – Regional Fault Map

REFERENCES

California D.O.G. (1961), California Oil and Gas Fields, Maps and Data Sheets, Part 2, Los Angeles-Ventura Basins and Central Coastal Regions, California Division of Oil and Gas, Cat Canyon Oil Field: East and Olivera Canyon Areas.

California D.O.G. (1974), California Oil and Gas Fields, Volume II, South, Central Coastal, and Offshore California, California Division of Oil and Gas, East Cat Canyon Oil Field.

Dibblee, Thomas Jr. (1994), Geologic Map of the Sisquoc Quadrangle, Santa Barbara County, California, Prepared in cooperation with the California Department of Conservation, Division of Mines and Geology and the U.S. Geological Survey.

Fugro Consultants, Inc. (2012), Groundwater Source Supply Study, East Cat Canyon Field, Santa Barbara County, unpublished consultant report prepared for Aera Energy, dated March 28, 2012.

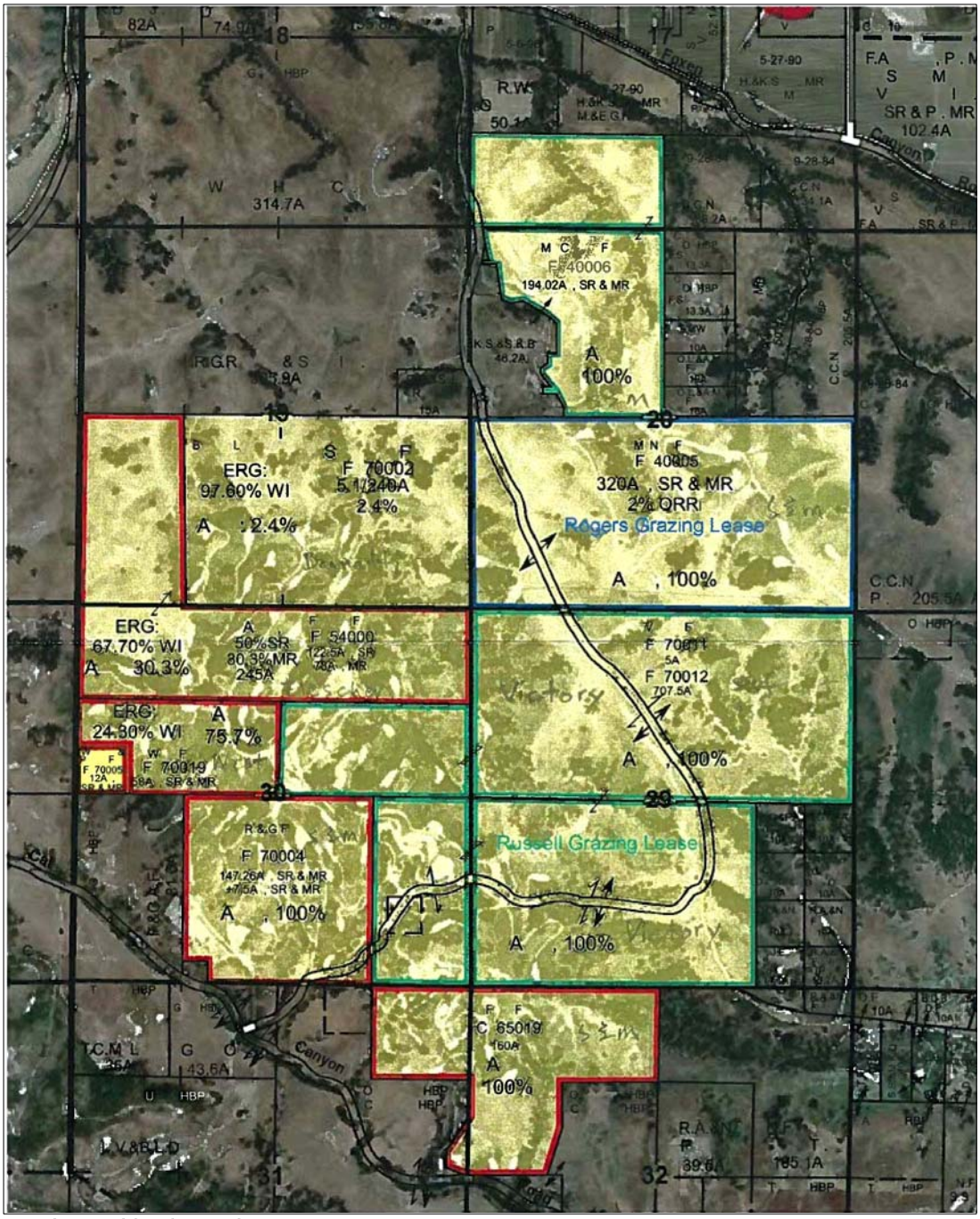
Hall, C.A., Jr. (1981), Map of Geology Along the Little Pine Fault, Parts of the Sisquoc, Foxen Canyon, Zaca lake, Bald mountain, Los Olivos, and Figueroa Mountain Quadrangles, Santa Barbara County, California, U.S. Geological Survey, Miscellaneous Field Studies Map MF-1285, Sheet 1 of 2.

Lettis, W.R., Hanson, K.L., Unruh, J.R., McLaren, M., and Savage, W.U. (2004), Quaternary Tectonic Setting of South-Central Coastal California, Chapter AA of “Evolution of Sedimentary Basins/Offshore Oil and Gas Investigations - Santa Maria Province, U.S. Geological Survey Bulletin 1995-AA, 21 pp.

Muir, Kenneth S. (1964), Geology and Groundwater of San Antonio Creek Valley, Santa Barbara County, California, Washington, U.S. Govt. Print, Off.

Woodring, W.P.; Bramlette, M.N. (1950), Geology and Paleontology of the Santa Maria District, California, Geological Survey Professional Paper 222.

PLATES



BASE MAP SOURCE: TJ Cross Engineers.

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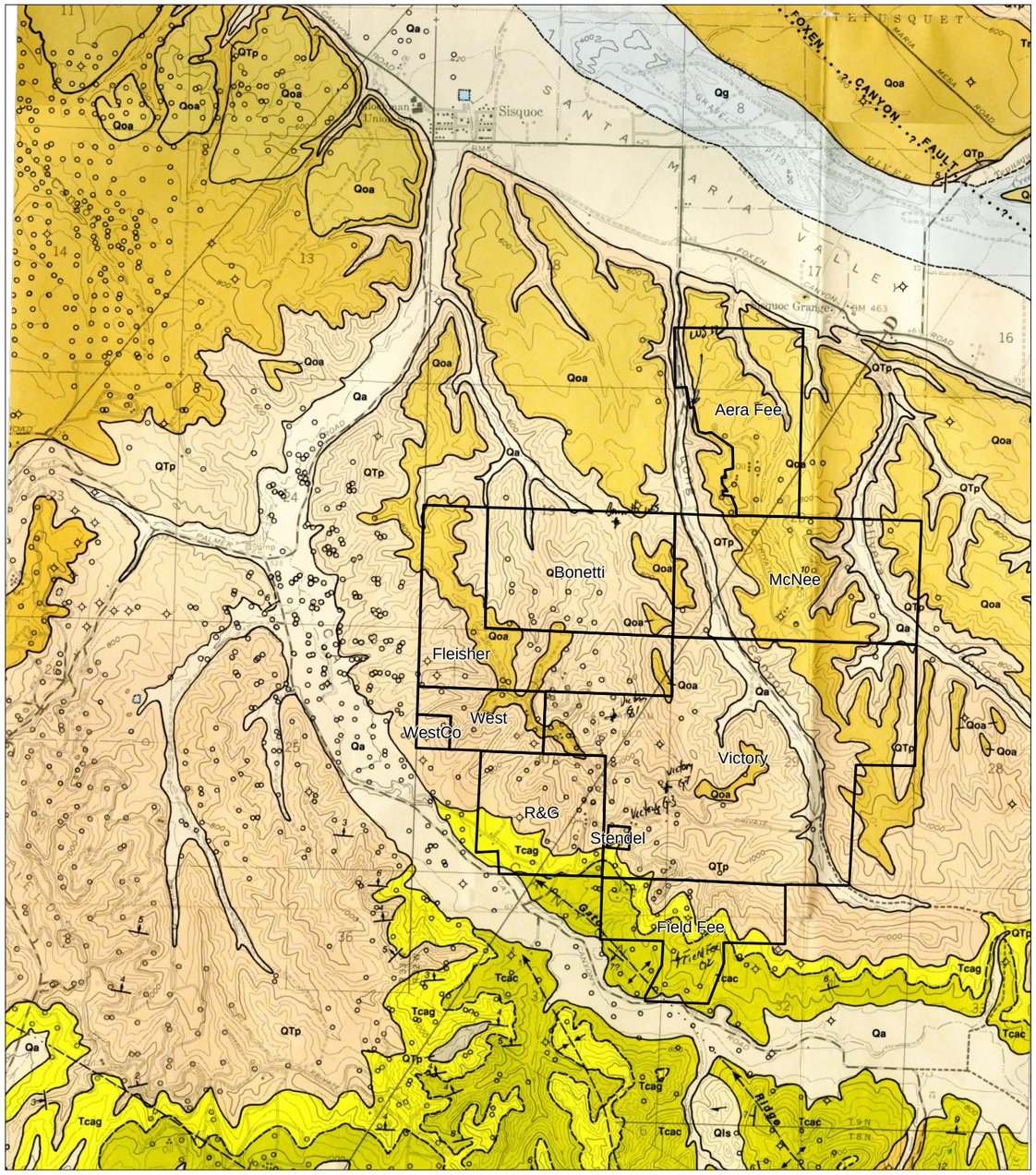
LOCATION MAP

East Cat Canyon Sisquoc Area

Santa Barbara County, California

PLATE 1



BASE MAP SOURCE: Geologic Map of the Sisquoc Quadrangle, Santa Barbara County, California, (Dibblee, 1994).

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LEGEND

Qa	Alluvium
Qg	Stream channel deposits
Qls	Landslide debris
Qoa	Older Alluvium
QTp	Paso Robles Formation
Tcag	Careaga Sandstone (Graciosa Member) - massive gray-white to tan sandstone
Tcac	Careaga Sandstone (Cebada Member) - massive tan to yellow, soft, fine grained sandstone
Tsqd	Sisquoc Formation
Tm	Monterey Shale

Formation Contact - dashed where inferred or indefinite

Fault - dashed where indefinite or inferred, dotted where concealed, relative vertical movement shown by U/D (U = upthrown side, D = downthrown side), short arrow indicates dip of fault plane, sawteeth are on upper plate of low angle thrust fault

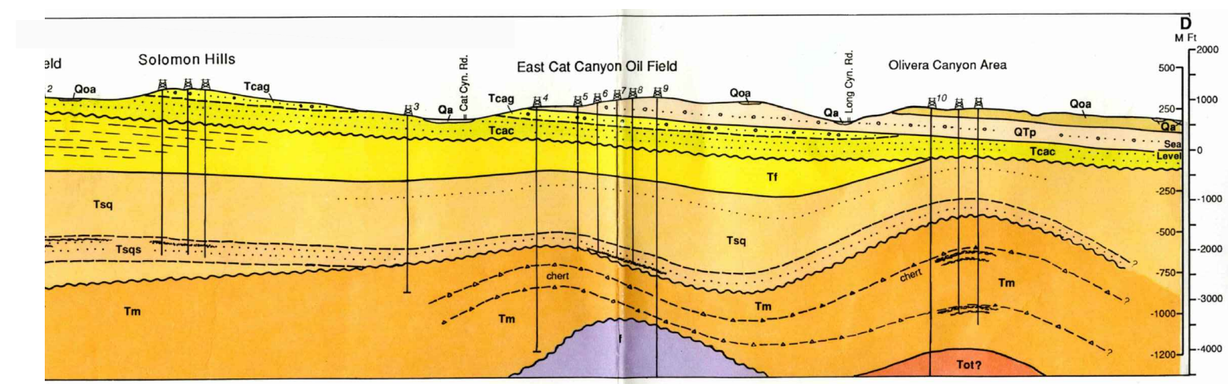
Anticline - dashed where inferred or indefinite

Syncline - dashed where inferred or indefinite

Strike and dip of beds:

20 Inclined

30 Vertical



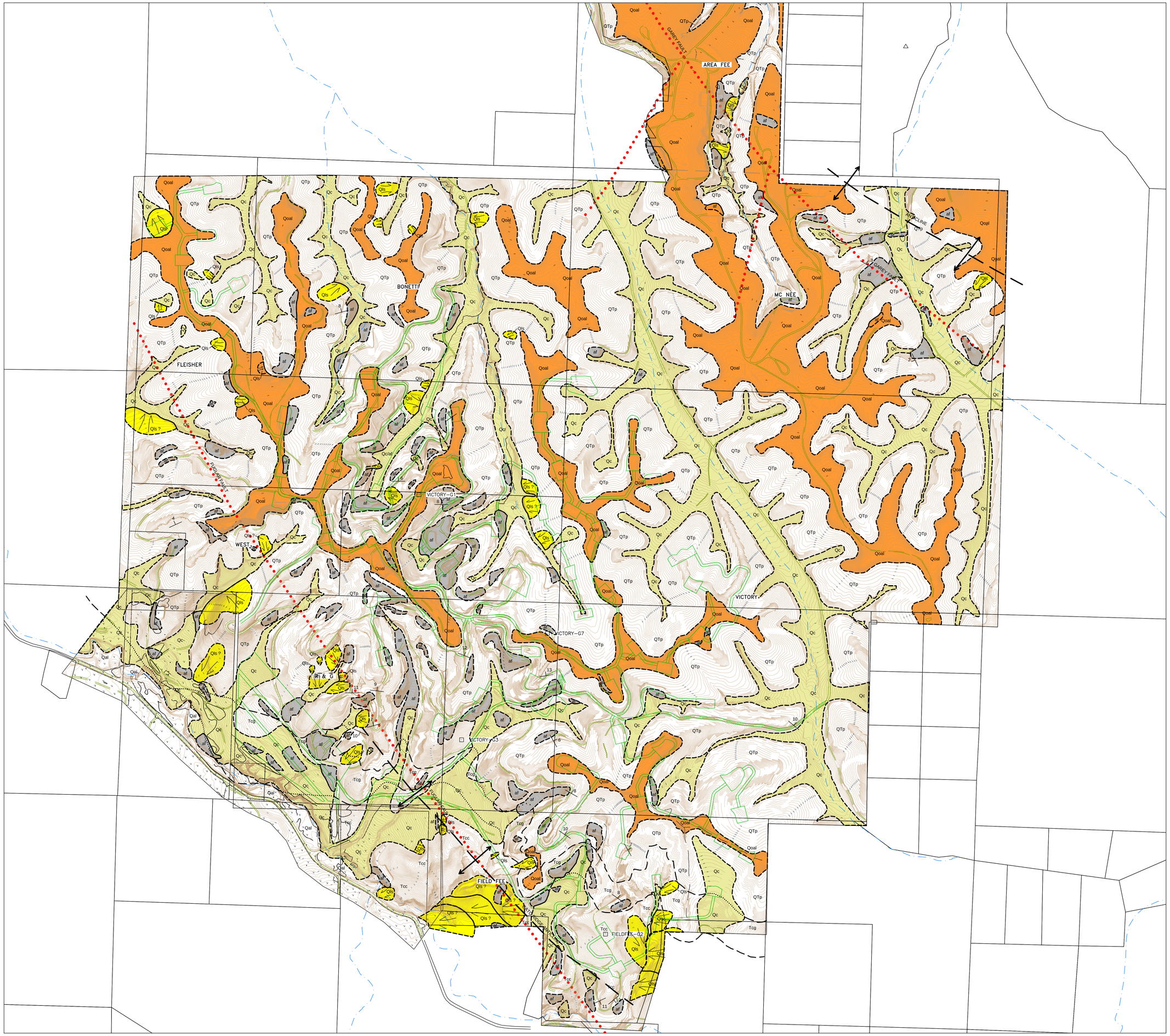
SOURCE: Section from Geologic Map of the Sisquoc Quadrangle, Santa Barbara County, California, (Dibblee, 1994).

3000
0
0 3000
Horizontal and Vertical Scales in Feet

Deep Wells shown:

3. Stone & Goodwin
4. R & G Oil Co., #11
5. R & G Oil Co., #5
6. R & G Oil Co., #6
7. Palmer-Stendel Oil Co., #9
8. Palmer-Stendel Oil Co., #10
9. Palmer-Stendel Oil Co., #20

REGIONAL GEOLOGIC MAP
East Cat Canyon Sisquoc Area
Santa Barbara County, California



LEGEND

af	Artificial fill
Qc	Colluvium
Qls	Landslide deposits
Qoal	Older Alluvium
QTp	Paso Robles Formation
Tcg	Carreaga Formation (Graciosa Coarse-Grained Member)
Tcc	Carreaga Formation (Cebada Fine-Grained Member)
	Fault, dotted where concealed
9	Strike and dip of bedding
	Anticline axis

NORTH

0 400 800 1200 1600
Feet

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GEOLOGIC MAP

Geohazards & Geotech Study AERA

Cat Canyon Oil Field
Santa Barbara County, California

Stugeon Services, International

04.62130155 December 2013 Plate 3

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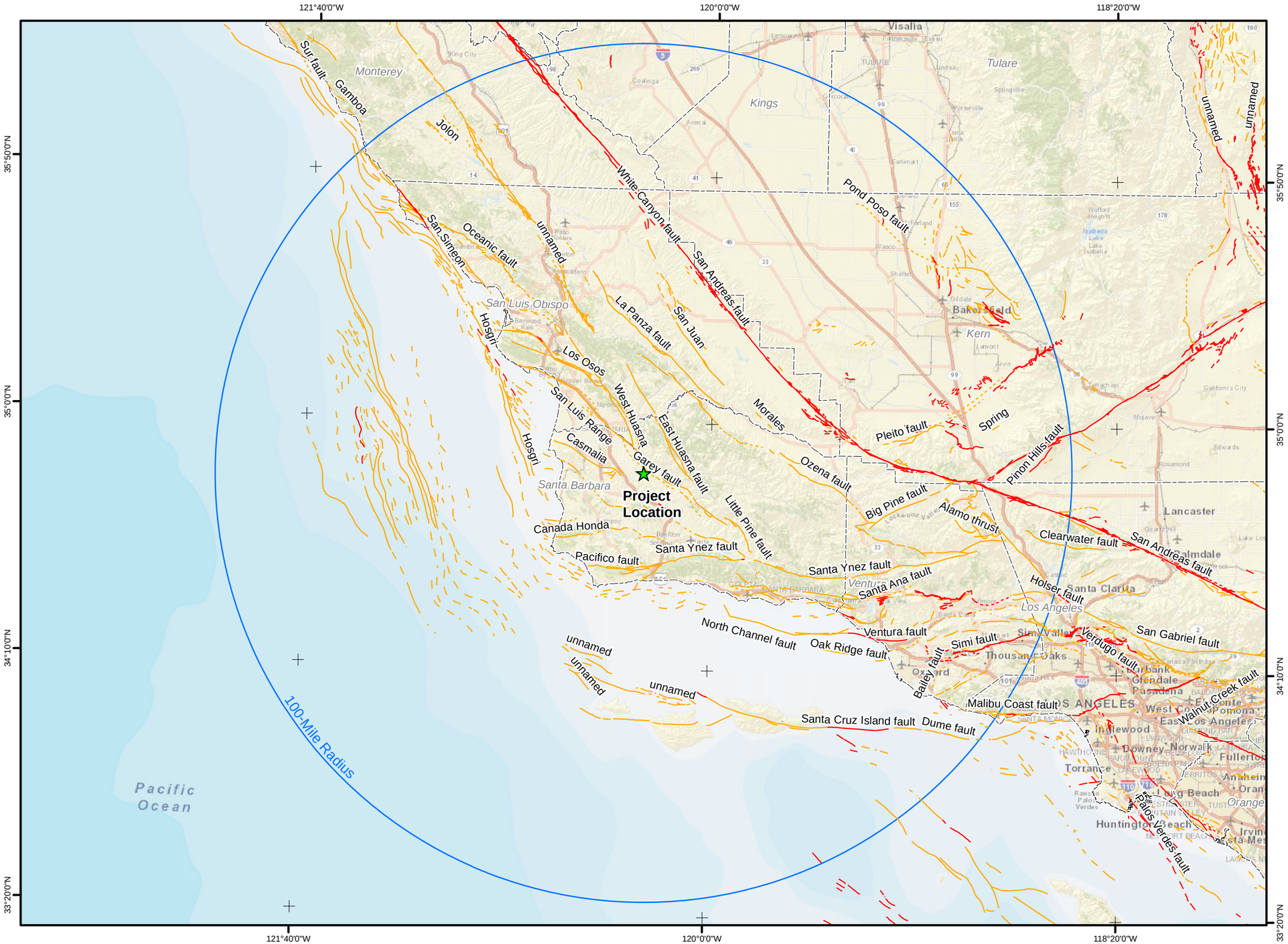

Legend

County Limits

Faults

Active Fault, dashed where inferred

Potentially Active Fault, dashed where inferred

Sources:

a) Bryant, 2005

b) Jennings, 1994

The Fuglar fault, discussed in the accompanying report, is not shown on this map because it is not recognizable at the scale of this regional map.

N

1:1,500,000

0 10 20 40 Miles

REGIONAL FAULT MAP
East Cat Canyon Oil Field, Sisquoc Area
Santa Barbara County, California

PLATE 4

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