



Benicia Refinery • Valero Refining Company - California
3400 East Second Street • Benicia, California 94510-1097 • Telephone (707) 745-7011 • Facsimile (707) 745-7432

March 5, 2013

Lower Tank Farm Geotechnical Study
Valero Refining Company – CA
Facility B2626, Benicia Refinery

Mr. Tim Morgan
Project Manager
ESA Energy
1425 N. McDowell Boulevard, Suite 200
Petaluma, CA 94954

Dear Mr. Morgan:

Enclosed is the geotechnical study of the Benicia Refinery lower tank farm area, which was initiated as a part of the site analysis for the CBR Logistics Plan.

The study identified a potential risk of seismic settlement in the study area based on current site conditions. The geotechnical results caused Valero to discover soil conditions not previously known in the study area. Our risk management analysis determined that a civil engineering remedy is necessary to protect existing infrastructure and the surrounding environment, regardless of future plans in that area. Therefore, an independent project is underway to design and install an appropriate remedy.

The independent mitigation plan will incorporate considerations for groundwater wells and other existing conditions so that the end result is fully compliant with all applicable requirements. The mitigation plan will be designed and implemented with the goal of protecting existing and any future infrastructure in the study area.

Please contact me at 707-745-7203 if you have any questions or need additional information.

Sincerely,

A handwritten signature in cursive script that reads "Susan K. Gustofson for".

Susan K. Gustofson, P.E.
Staff Environmental Engineer

SKG/tac

Enclosure: Geotechnical Report dated February 28, 2013

ecc: w/enclosure
Mr. Chuck Bennett, ESA
Ms. Lynn McGuire, ERM

Mr. Mr. Tim Morgan, ESA Energy
March 5, 2013
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Ebcc: (w/attachments)

Steve Penny
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Pat Covert
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RIMS File Code: T5 / AI-12-00

RIMS File Name: T5 CBR ESA Correspondence

E-File Location: V:\Environmental\T5\AI_12_00_T5_Projects_APPLICATIONS\
Refinery B2626\Crude by Rail\ESA Correspondence\CBR Seismic
Study 05Feb13 Cover Letter 23645.docx



February 28, 2013
File No: 131669

Mr. Stephen Penny
Valero Refining Company - California
3400 E. Second Street
Benicia, CA 94510
(Steve.Penny@valero.com)

SUBJECT: Subsurface and Seismic Conditions along Avenue A, Valero Refinery, Benicia, California

Dear Mr. Penny:

This document summarizes the subsurface and seismic performance conditions anticipated along Avenue A from about refinery gridlines N11,200 to N15,200 and from Avenue A westward to about Avenue D. Recent subsurface investigation along Avenue A has revealed the potential for seismic settlement and ground deformation as summarized below.

Subsurface Conditions

The area between about 8th Street and N15,200 and from Avenue A to Avenue D (referred to herein as the lower tank field) is generally occupied by above ground storage tanks and piping and has a surface elevation of about 20 ft. (MSL). The area is generally underlain by about 10 to 15 feet of manmade fill which is in turn underlain by alluvial and residual soils and bedrock. Approximately the upper 10 feet of fill is engineered fill (stiff, moderately expansive clay) placed during refinery development in the late 1960's. The lower approximately 5 feet is older fill that was placed for the former Benicia Army Arsenal. The native soils below the fill are primarily clays but sandy layers are present. The native clays are moderately to highly compressible between about gridline N11,200 and 9th Street. South of 8th Street, the former ground surface was raised up to about elevation 53 ft. by the placement of compacted fill to create the upper storage tank area south of 6th Street and west of Avenue B.

Groundwater along the Avenue A is 10 to 15 feet deep and varies seasonally and due to remedial extraction.

Seismic Setting

The refinery is not located in a mapped active earthquake fault zone. The nearest known active fault is the Concord Green Valley fault located about 1¾ miles to the northeast. However, the site and the entire Bay Area are expected to experience strong ground shaking during a moderate to large earthquake on one of the active Bay Area faults in the future.

Geotechnical Concerns

The fill soils should provide adequate bearing support for light to moderately heavy loads. Heavy loads such as storage tanks in the lower tank field have resulted in large settlements (some in excess of a foot) due to the compressible soil discussed above. This potential was anticipated and gradual loading or preloading and monitoring was used to construct the tanks. The high fill slope south of 8th street was constructed in stages over the compressible soil to prevent failure. We understand the upper and lower tanks fields and facilities are performing adequately under static loads.

The main geotechnical concern for portions of the lower tank field and high slope along Avenue A south of 8th street is the potential for seismically induced settlement and associated lateral migration toward Sulphur Springs Creek east of and parallel to Avenue B. These phenomena, known as liquefaction and lateral spreading, have the potential to result in vertical surface settlement of several inches and horizontal ground displacement of several feet. This could result in damage to the tanks, piping, roadways and containment berms.

The full lateral extent of the liquefiable and lateral spreading areas has not been determined at this time. In general the layers of concern detected to date are relatively thin (typically less than 5 feet and generally a couple of feet thick). If they are found to be discontinuous, the impact of a moderate to large earthquake may not be as significant as currently judged.

Limitations

Kleinfelder offers a range of geotechnical and environmental engineering services to suit the varying needs of our clients. Although risk can never be eliminated, more detailed and extensive investigations yield more information, which may help understand and manage the degree of risk. Since such detailed services involve greater expense, our clients participate in determining the level of service which provides adequate information for their purposes at acceptable levels of risk. Kleinfelder will perform its services in a manner consistent with the standards of care and skill ordinarily exercised by members of the profession practicing under similar conditions in the geographic vicinity and at the time the services will be performed. Therefore, no warranty or guarantee, expressed or implied, is part of the services offered by this proposal, nor does it create any fiduciary responsibility to the Client by Kleinfelder.

Closure

If you have any questions about this initial evaluation, please call the undersigned at 925.484.1700.

Sincerely,

KLEINFELDER WEST, INC.



Donald G. Gray, P.E., G.E
Principal Geotechnical Engineer



Cristiano Melo, P.E., G.E
Project Manager

DGG/CM/jmk

CC: Tom Lam, Valero (Tom.Lam@Valero.com)
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