FINAL PRELIMINARY ENDANGERMENT ASSESSMENT

Caltrans Modesto Soil Stockpiles
State Route 132/99 Interchange
Stanislaus County, California

June 30, 2009

Prepared for:

California Department of Transportation
Office of Environmental Engineering, District 6
2015 East Shields Ave., Suite 100
Fresno, California 93726

Prepared by:

Shaw Environmental, Inc.
2033 Gateway Place, Fifth Floor
San Jose, California 95110

Task Order No.: 19
Contract No.: 06A1141

Project No.: 128232

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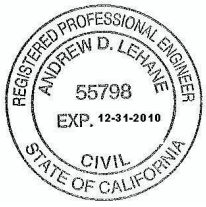

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Executive Summary

This report presents the results of a preliminary endangerment assessment (PEA) performed by Shaw Environmental, Inc. (Shaw) for the California Department of Transportation (Caltrans) Modesto Soil Stockpiles Site (Site) located in Modesto, California. The PEA addresses three soil stockpiles located on the Caltrans Site. This investigation was conducted at the request and authorization of Mr. Richard Stewart of Caltrans under Contract No. 06A1141, Task Order No. 19.

The soil stockpiles were generated by Caltrans during the excavation of an evaporation pond located on property purchased from FMC during the construction of State Route 99 through Modesto (circa 1961). Soil in and around the impoundment was excavated during construction and stockpiled within the current Caltrans right-of-way at the location of the future State Route 132/99 interchange project.

A Preliminary Site Investigation conducted in 2004 determined that two of the stockpiles contained elevated levels of barium. A subsequent Remedial Action Report which evaluated remedial options was prepared and submitted for regulatory review. The California Environmental Protection Agency Department of Toxic Substances Control (DTSC) reviewed reports and provided recommendations.

In response to DTSC recommendations, additional site characterization of soil and groundwater were performed, and a human health risk assessment was prepared by Shaw. In addition, an ecological screening evaluation and community profile were prepared by Caltrans. DTSC reviewed the soil and groundwater investigation reports and human health risk assessment, and provided recommendations. This PEA was prepared in response to DTSC recommendations.

This PEA presents a summary of site investigation and assessment activities, results, conclusions, and recommendations for further action. The results of the soil and groundwater characterization, human health risk assessment, and ecological screening evaluation in this PEA support a recommendation of no further investigation or remedial action activities for the Site under the current and proposed future land-use scenarios. However, recommendations are made for implementing a number of institutional controls.

1.0 Introduction

This report presents the results of a preliminary endangerment assessment (PEA) performed by Shaw Environmental, Inc. (Shaw) for the California Department of Transportation (Caltrans) Modesto Soil Stockpiles Site (Site) located adjacent to State Route (SR) 99 and Kansas Avenue in Modesto, California (Figure 1). The PEA addresses three soil stockpiles located on the Caltrans Site, SP#1, SP#2 and SP #3 (Figure 2). This work was conducted at the request and authorization of Mr. Richard Stewart of Caltrans under Contract No. 06A1141, Task Order No. 19 (Caltrans, 2007).

Barium Products Ltd. occupied the 1200 Barium Road property (now Graphics Drive) in Modesto, which lies east of SR 99 between Woodland and Kansas Avenues. Barium Products Ltd. was a chemical manufacturing company processing a variety of ores and minerals, including barite (barium sulfate) and celestite (strontium sulfate). The ore processing facility was in operation as early as 1930. Barium Products Ltd. was purchased by Westvaco Chlorine Products Corporation in 1943, and in 1948 Westvaco Chlorine Products Corporation merged with Food Machinery and Chemical Corporation (later FMC, Inc.). From the 1950s to the 1970s, a liquid residue from the processing operations was discharged to the unlined evaporation ponds along the western portion of the FMC site.

The soil stockpiles were generated by Caltrans during the excavation of an evaporation pond located on property purchased from FMC during the construction of State Route 99 through Modesto (circa 1961). Soil in and around the impoundment was excavated during construction and stockpiled within the current Caltrans right-of-way at the location of the future SR 132/99 interchange project.

A Preliminary Site Investigation in 2004 determined that two of the stockpiles contained elevated levels of barium (Shaw 2004a). A subsequent Remedial Action Report which evaluated remedial options was prepared (Shaw 2004b). The California Environmental Protection Agency Department of Toxic Substances Control (DTSC) reviewed the reports and provided recommendations.

In response to DTSC recommendations, additional site characterization of soil and groundwater were performed, and a human health risk assessment (HHRA) was prepared by Shaw. In addition, an ecological screening evaluation and community profile were prepared by Caltrans. DTSC reviewed the soil and groundwater investigation reports and HHRA, and provided recommendations. This PEA was prepared in response to DTSC recommendations. The objective of this report is to present a summary of site investigation and assessment activities, results, conclusions, and recommendations.

This PEA was prepared in accordance with the *Preliminary Endangerment Assessment Guidance Manual* (DTSC, 1999) and additional guidance documents, as noted in the references sections of this report and related reports included as appendices.

2.0 Site Description

The Site consists of three soil stockpiles generated during the construction of SR 99 through Modesto around 1961. The construction of a highway interchange is proposed for the Caltrans property.

2.1 Site Identification Information

The Site is known as the Caltrans Modesto Soil Stockpiles. The Site is located on a portion of approximately 21 acres owned by the State which are spread over a number of parcels, as shown in Books 029 and 101 of the Stanislaus County Assessor's Parcel Maps. The Site is located in Township 3 South, Range 9 East, Sections 29 and 30, Mount Diablo Base and Meridian. The soil stockpiles are at the location of the proposed SR 132/99 interchange, and the land use designation for the Site is public right-of-way.

There is no proper street address or mailing address for the Site itself. The Caltrans Site contact is Mr. Richard Stewart, Caltrans Project Manager. Mr. Stewart's mailing address is 2015 E. Shields Avenue, Suite 100, Fresno, California, 93726; his phone number is 559.243.8229.

The EnviroStor database identification number for the Site is 50280024.

A portion of the Site was formerly part of the FMC, Inc. facility at 1200 Barium Road (now Graphics Drive) identified in the DTSC EnviroStor database as "FMC-Modesto".

2.2 Site Maps

The Site location is illustrated on Figure 1. A more detailed diagram of the soil stockpiles at the Site is shown on Figure 2.

3.0 Background

3.1 Site Status and History

The soil stockpiles are part of the Caltrans right-of-way which is the planned location for the future SR 132/99 interchange. Three distinct soil stockpiles are present at the Site as shown on Figure 2:

- Stockpile SP#1, located south of Kansas Avenue and west of North Emerald Avenue
- Stockpile SP#2, located south of Kansas Avenue, between North Emerald Avenue and SR 99
- Stockpile SP#3, located south of Kansas Avenue and east of SR 99

Each of the stockpiles is currently fenced and the stockpiles were observed to be well vegetated during several visits by Shaw personnel. The vegetation consisted of grasses and small bushes, especially during the winter months when rain occurs. However, the stockpiles are also covered in grass during the summer months. It is estimated that 85% of the stockpiles is covered in vegetation year round. A Caltrans employee mows each of the stockpiles once a year, just before the Independence Day holiday, to decrease the risk of fire.

The soil stockpiles are isolated and surrounding land use is dominated by urban development (commercial, industrial, and residential). SR 99 runs in a northwestern-southeastern direction through the area. Properties located south of SP#1 and SP#2 consist of single-family residential subdivisions; to the north are numerous commercial businesses. Located directly west of SP#1 is the Caltrans right-of-way for the continuation of SR 132. Industrial and commercial developments are located north and east of SP#3. Agricultural lands (orchard, vineyard, and fallow agricultural lands) are also found to a lesser degree within the Site vicinity.

3.2 Hazardous Substance/Waste Management Information

Barium Products Ltd. occupied the property at 1200 Barium Road (now Graphics Drive) in Modesto, east of SR 99 between Woodland and Kansas Avenues. Barium Products Ltd. was a chemical manufacturing company processing a variety of ores and minerals, including barite (barium sulfate) and celestite (strontium sulfate). Materials produced included barium and strontium compounds used in greases, lubricating oil, and pigment blanks. Sodium sulfide, generated as a by-product of barite processing, was sold as a caustic and also used as a reagent in the mining industry. The ore processing facility was in operation as early as 1930.

Barium Products Ltd. was purchased by Westvaco Chlorine Products Corporation in 1943, and in 1948 Westvaco Chlorine Products Corporation merged with Food Machinery and Chemical

Corporation (later FMC, Inc.). From the 1950s to the 1970s, a liquid residue from the processing operations was discharged to the unlined evaporation ponds along the western portion of the FMC site. In 1961, a 4.3-acre parcel at the southwest corner of the FMC site was purchased by the State of California for right-of-way needed to construct SR 99. Aerial photos from 1957 indicate that a portion of the southernmost evaporation pond of the FMC facility was within the area purchased for the right-of-way.

The soil stockpiles were generated by Caltrans during the excavation of an evaporation pond located on property purchased from FMC during the construction of State Route 99 through Modesto (circa 1961). Soil in and around the impoundment was excavated during construction and stockpiled within the current Caltrans right-of-way at the location of the future SR 132/99 interchange project.

A Preliminary Site Investigation (PSI) was conducted by Shaw in January 2004, and the Final PSI Report was submitted in June 2004 (Shaw, 2004a). Remedial options with regard to soil constituents were evaluated in a subsequent Remedial Action Report (Shaw 2004b). DTSC reviewed the PSI Report and provided recommendations in a letter to Caltrans dated April 8, 2005 (DTSC 2005).

4.0 Apparent Problem

The primary source of potential contamination at the Site is barium-contaminated soil from the former FMC facility. The soil stockpiles were generated when SR 99 was constructed through a small area of the FMC facility that was purchased by the State of California. That area contained a portion of one of the FMC facility's evaporation ponds. Soil excavated from that area was stockpiled at its present location within the Caltrans right-of-way for the future SR 132/99 interchange. Based on Site history, other metals and semivolatile organic compounds (SVOCs) were also deemed to be a potential concern.

A PSI was conducted by Shaw in January 2004, and the Final PSI report was submitted in June 2004 (Shaw, 2004a). Shaw performed additional site investigation in 2006 to further characterize the soil stockpiles and compare their chemical contents relative to background conditions and established health goals, if necessary. Shaw also performed site investigation in 2006 to assess groundwater beneath the Site for potential water quality impacts relative to constituents of concern (COCs) in the soil stockpiles and to establish groundwater concentrations of COCs and selected other constituents. The soil and groundwater investigations complemented a concurrent human health risk assessment which integrated the data from the soil and groundwater investigations. The *Human Health Risk Assessment* (*HHRA*) prepared by Shaw is contained in Appendix A of this PEA. The results of the 2006 soil investigation are presented in *Site Investigation Report, Characterization of Soil Stockpiles,* contained in Appendix A of the *HHRA*. The results of the 2006 groundwater investigation are presented in *Site Investigation Report, Groundwater Assessment,* included as Appendix B of the *HHRA.*

The goal of the *HHRA* was to provide an estimate of the potential chronic health risks and hazards to persons exposed to COCs from the Site. COCs in the soil stockpiles included metals and SVOCs; only metals were detected in groundwater. Both residential and construction exposure scenarios were incorporated into the *HHRA*, providing estimates of risks or hazards from Site media to potential current and future human receptors. The potential human receptors of concern for soil included the current trespasser and off-site resident, and the future on-site construction worker and off-site resident. Additionally, a conservative risk assessment was also conducted for a hypothetical residential groundwater use.

Soil at the Site is the primary source medium. Potential exposure pathways associated with direct surface soil contact for the current exposure scenario include incidental ingestion, inhalation of dust, and dermal contact. The future land-use scenario also has soil as the primary source medium, including both surface and subsurface soils exposed during construction activities. Potential exposure routes associated with the future land-use scenario include incidental ingestion, dermal contact, and inhalation of dust for the on-site construction worker,

and inhalation of dust by the off-site resident. Shallow groundwater may be impacted by previous Site or off-site activities; however, because there is currently no use of the groundwater for drinking or domestic purposes, only a hypothetical future groundwater use by the off-site resident is included.

As previously discussed, the soil stockpiles are isolated and surrounding land use is dominated by urban development (commercial, industrial, and residential). An ecological screening assessment performed by Caltrans did not identify any environmental resources of concern with the potential to be impacted by the Site. A memorandum providing details of the ecological screening assessment is included in Appendix B of this PEA.

5.0 Environmental Setting

The factors related to soil, water, and air pathways are summarized in the following sections. These factors are discussed in greater detail in the *HHRA* (Appendix A).

5.1 Factors Related to Soil Pathways

The soil stockpiles were placed on an existing ground surface which may have included some minor topographic relief. Shallow, pre-existing depressions may have been filled as the soil stockpiles were constructed. Each of the stockpiles is currently fenced, and the Site is heavily vegetated.

The strata at background locations and native soil strata upon which the stockpiles were constructed are composed of silts, silty sands, and sand layers of the Modesto Formation. The Modesto Formation is a low-angle alluvial fan deposit with characteristic lenticular deposits of sand and silty clay. These fans, being relatively low-angle and laterally extensive, can exhibit the characteristics of fluvial depositional environments such as meandering streams. The Site native soil and background lithologies are consistent with deposition in a low-angle alluvial fan deposit, including laterally discontinuous clay and silty clay units intermixed with the predominantly sandy-silty soils.

The soil encountered in background borings and the native soil beneath the stockpiles includes sands, silts and clay. The background soil varies in composition from lean clay to silt, to sands with intermediate mixtures of these grain sizes. The subsurface at the background soil sample locations is, to some extent, sandier than native soils encountered directly beneath the stockpiles.

The stockpile soils are generally similar to the background/native soils, although distinct layers of what appear to be non-native materials are present within the stockpiles. Layers of dark gray, bluish-gray and grayish-blue non-native materials are observed in the stockpiles. However, gray coloration was observed in all stockpiles and in some background soil, indicating the color may be a guide to, but not an absolute marker of, non-native materials.

COCs in soil detected during site characterization of the stockpiles include metals and SVOCs. A detailed discussion of the results of site investigation for the characterization of soil stockpiles is included in the *HHRA* (Appendix A).

5.2 Factors Related to Water Pathways

The Site lithology is dominated by silty soils with laterally discontinuous lenses of interbedded sand, silty sands, and clays. In the areas of the Site investigated, the vadose zone was dominated by silty soils. During the site investigation conducted for the groundwater assessment performed

in 2006, groundwater beneath the stockpiles was encountered at a depth of approximately 35 feet below ground surface under semi-confined conditions. Based on water level measurements made during the June and October 2006 sampling events performed by Shaw, groundwater flows are to the southeast at a gradient of approximately 0.001 foot/foot.

The hydrogeology of the adjacent FMC site has been characterized by numerous studies beginning in the early 1980s. The GeoTrans report *Addendum to the Comprehensive Remedial Investigation Report, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California* (GeoTrans, 2005) provides a description of the FMC site hydrogeology which is similar to the conditions observed by Shaw at the Modesto Soil Stockpiles Site. The shallow aquifer conditions beneath the two sites appear similar and are likely representative of the local area.

Groundwater analyzed during the assessment yielded detectable concentrations of 13 metals; however, no metal exceeded its respective primary Maximum Contaminant Level (MCL) for drinking water established by the California Department of Health Services. One metal, manganese, was found at concentrations exceeding the secondary consumer acceptance limit MCL. There were no detections of polycyclic aromatic hydrocarbons (PAHs) in any groundwater samples. A detailed discussion of the results of site investigation for groundwater assessment is included in the *HHRA* (Appendix A).

A well survey conducted by Shaw using data from the California Department of Water Resources did not identify any active water supply wells screened in the shallow groundwater aquifer within a 1-mile radius in the general (southeast) flow direction from the Site.

The Site is located in a semi-arid region of the Central Valley. No surface water bodies exist at the Site. Very minor puddles (approximately 1 inch deep) may form along the Site boundaries from storm water runoff during significant rainfall events; however, these rain events are infrequent, and significant exposure does not occur. Due to the Site topography, vegetation, and limited rainfall events, surface water was not evaluated as a pathway in the *HHRA*.

5.3 Factors Related to Air Pathways

The Site history and conceptual exposure model indicate that one medium of potential concern is outdoor air. The primary source media for the air pathway are surface and subsurface soils at the Site. The exposure pathway relating to air is inhalation of soil particulates in outdoor air. The mechanisms for release of soil particulates include wind erosion and construction activities. The potential human receptors for exposure to metals and SVOCs in outdoor air included on-site trespassers, and off-site residents. Models were used to estimate outdoor air concentrations of metals and SVOCs, rather than outdoor air samples. A detailed discussion of the models,

methodology, input, and assumptions used in evaluating the outdoor air exposure route is presented in the *HHRA* (Appendix A).

6.0 Sampling Activities and Results

A PSI was conducted by Shaw in January 2004, and the PSI report was submitted in June 2004 (Shaw, 2004a). Shaw performed additional site investigation in 2006 to further characterize the soil stockpiles and compare their chemical contents relative to background conditions and established health goals, if necessary. Shaw also performed site investigation in 2006 to assess groundwater beneath the Site for potential water quality impacts relative to constituents of concern (COCs) in the soil stockpiles and to establish groundwater concentrations of COCs and selected other constituents. A summary of the 2006 investigation activities is presented in the following sections. The results of the 2006 soil investigation are presented in *Site Investigation Report, Characterization of Soil Stockpiles*, contained in Appendix A of the *HHRA* (Appendix A). The results of the 2006 site groundwater investigation are presented in *Site Investigation Report, Groundwater Assessment*, included as Appendix B of the *HHRA* (Appendix A).

6.1 Summary of Activities

Soil Investigation

The soil investigation included 8 background soil borings and 51 investigative soil borings in the three soil stockpiles. Drilling of soil borings was conducted by Shaw between May 15 and 19, 2006. The assessment included soil borings driven by a direct-push drill rig into SP#1, SP#2, and SP#3 and into native soil beneath each stockpile. Samples were collected at designated intervals from the borings within and below each stockpile and at background locations. A total of 278 soil samples (24 background, 165 stockpile, and 89 native) were collected from the soil borings.

Soil samples collected from the soil stockpiles, underlying native soil, and background soil were analyzed for Title 22 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc), nitrate, sulfate, sulfide, and polycylic aromatic hydrocarbons (PAHs). Metals were analyzed for in all samples; additional analytical methods were applied to selected samples. Waste Extraction Test (WET) and/or Deionized Water Waste Extraction Test (DI-WET) analyses were performed on a total of 34 soil samples, 30 samples from SP#2 and 4 samples from SP#3. Sulfate, nitrate, and sulfide were analyzed in a subset of 69 samples collected during the investigation. Laboratory analyses were conducted in accordance with U.S. Environmental Protection Agency (USEPA) specified holding times by a California-certified analytical laboratory.

Groundwater Investigation

The groundwater assessment included the installation of eight monitoring wells adjacent to the three soil stockpiles at the Site during May and June of 2006. The wells were installed to a depth of approximately 5 feet below first-encountered groundwater using a hollow-stem auger drilling rig. Monitoring wells were constructed of 2-inch schedule 40 polyvinyl chloride casing, and subsequently developed between 48 hours and seven days after installation. The geologic and hydrogeologic characteristics of the Site were interpreted from information derived during the well installations, subsequent monitoring events, and FMC site assessments.

Two post-installation groundwater-sampling events were conducted: one in June and a second in October of 2006. The first event occurred on June 13 and 14, 2006, and included all eight wells. The second event was conducted on October 4 and 5, 2006, with samples collected from all eight wells. Analytical suites for the June event included one sample collected from each well and analyzed for dissolved metals, sulfide, sulfate, nitrate, and PAHs; analytical suites for the October event were similar, except that general water quality analyses were added. The groundwater sample fraction used for analysis of dissolved metals was passed through a 0.45-micron filter in the field to remove suspended sediments and associated total metals adsorbed onto sediment particles. All groundwater sample analyses were conducted in accordance with USEPA-specified holding times by a California-certified analytical laboratory.

6.2 Presentation of Data

Soil Results

Seven metals (antimony, beryllium, cadmium, mercury, selenium, sliver, and thallium) were not detected in any of the 24 background soil samples. Detectable concentrations of ten metals (arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium, and zinc) were observed in background samples.

Three metals (antimony, selenium, and silver) were not detected in any of the 165 stockpile soil samples. Detectable concentrations of 14 metals (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, vanadium, and zinc) were observed in stockpile soil samples. Five metals (antimony, cadmium, mercury, selenium, and sliver) were not detected in any of the 89 native soil samples beneath the stockpiles.

A total of 58 samples were analyzed for PAHs during the soil investigation, including 38 stockpile samples, 16 native samples, and 4 background samples. Detectable concentrations of PAHs were reported for two locations: three PAHs [benzo(a)pyrene, fluoranthene, and pyrene] were detected in one boring at SP#3; three PAHs [benzo(a)pyrene, benzo(g,h,i)perylene, and chrysene] were detected in one boring at SP#1. No PAHs were detected in the remaining 36 soil stockpile samples. Two locations at SP#1 had detectable concentrations of PAHs (2-

methylnapthalene and phenanthrene) in samples of native soil underlying the stockpile. No other PAH detections were reported in the remaining 14 samples of underlying native soils. No PAHs were detected in any of the 4 background samples.

Sulfate concentrations in soil samples collected from within SP#1, SP#2, and SP#3 were highly variable. It was noted that elevated sulfate concentrations frequently occurred in samples which also contained elevated concentrations of barium. In general, sulfate concentrations from native soil were lower than concentrations in stockpile samples. Twelve of the 24 native soil samples contained concentrations exceeding the background value for sulfate.

Nitrate concentrations in stockpile soil samples were similar to concentrations in background soil samples, except one sample from native soil underlying SP#2 which was elevated.

Sulfide was detected in one stockpile soil sample from SP#2; no other soil samples contained detectable concentrations of sulfide.

Groundwater Results

Antimony, beryllium, cadmium, mercury, and thallium were not detected above their respective reporting limits in any groundwater samples. Detectable concentrations of the remaining metals did not exceed their respective primary maximum contaminant levels (MCLs) in samples collected during the groundwater assessment sampling. Manganese was detected in three samples in excess of secondary consumer acceptance MCL criteria during the June sampling event and in two samples during the October sampling event. Sixteen groundwater samples were analyzed for PAHs during the two sampling events and no detectable concentrations were reported at their respective reporting limits.

A well survey conducted by Shaw using data from the California Department of Water Resources did not identify any active water supply wells screened in the shallow groundwater aquifer within a 1-mile radius in the general (southeast) flow direction from the Site.

6.3 Discussion of Results

Soil

Detections of PAHs were infrequent in samples collected from or below the soil stockpiles, with only 3 of the 54 samples analyzed for PAHs having detectable concentrations.

The detection frequencies of many inorganics within the stockpiles were similar to those found on the FMC property. Stockpiles SP#2 and SP#3 contain elevated concentrations of sulfate and barium, reflecting potential origins from the evaporation pond at FMC. Other inorganics are present, but their potential relationship to the FMC facility is less apparent.

The evaluation of inorganics included the determination of background metals concentrations by establishing the arithmetic mean or 95th upper confidence level (95th UCL). The Site background values provided a basis for comparison of stockpile analytical results. A statistical analysis was also conducted to evaluate the average concentrations of chemicals within the soil stockpiles.

The soil stockpiles were constructed in semi-continuous layers with some zones containing higher concentrations of metals. Much of the stockpile material is similar to native soils, although some distinctly colored, grayish material layers are present within the stockpiles. The grayish material zones are frequently associated with elevated barium concentrations, but correlation between color and barium content is not absolute.

The analytical results were compared to background concentrations and Office of Environmental Health Hazard Assessment (OEHHA) human health criteria (OEHHA, 2005). Arsenic, lead, and barium were detected at concentrations exceeding the OEHHA criteria. Metals concentrations detected in SP#1 were comparable with those detected in background samples, but SP#2 and SP#3 were found to contain higher concentrations of barium and sulfate. Arsenic and lead were detected in all three stockpiles at concentrations exceeding background concentrations.

The solubilities of barium, lead, and sulfate were evaluated using the result of the WET and DI-WET analyses. Regression analysis was used to predict soluble WET concentrations from the total/WET soluble data for barium and lead. Barium was frequently detected throughout soil stockpiles at elevated concentrations relative to background values. The barium originates from barite ore (barium sulfate), and the majority of the barium appears to retain a relatively insoluble chemical form. Lead was generally present at low levels, but soils for 2 locations had elevated concentrations with the potential to exceed Title 22 criteria for Class III disposal.

Groundwater

Analytical results for the June and October 2006 groundwater sampling events were comparable, showing some variability but similar concentrations for nearly all constituents. Detectable concentrations of the remaining metals did not exceed their respective primary maximum contaminant levels (MCLs) in samples collected during the groundwater assessment sampling. Manganese was detected in three samples in excess of secondary consumer acceptance MCL criteria during the June sampling event and in two samples during the October sampling event. Total dissolved solids (TDS) exceed the secondary recommended MCL in samples from three wells.

Nitrate and sulfate concentrations varied somewhat between the two sampling events but were generally within the same concentration ranges for both events. Sulfide was not detected in any of the samples collected from the Site monitoring wells.

7.0 Human Health Screening Evaluation

To provide an estimate of the potential chronic health risks and hazards to persons exposed to chemicals from the Site, Shaw prepared the *HHRA* contained in Appendix A of this PEA. The following sections summarize key components of the *HHRA*, which are presented in greater detail in Appendix A.

7.1 Exposure Pathways and Media of Concern

A conceptual site exposure model (CSEM) was prepared by Shaw to illustrate the media of concern and potential exposure pathways associated with the Site (Figure 3). The primary source of potential contamination at the Site is barium-contaminated soil from the stockpiles generated from the excavation of the pond at the former FMC facility. The historical Site information and CSEM indicate that the media of potential concern at the Site are soil, groundwater, and outdoor air. Chemicals detected in soil include metals and SVOCs, while groundwater only had detections of metals. Models were used in the *HHRA* to estimate the concentrations of metals and SVOCs in outdoor air, rather than outdoor air samples.

Both residential and construction exposure scenarios were incorporated into the *HHRA*, providing estimates of risks or hazards from Site media to potential current and future human receptors. The potential human receptors of concern for soil included the current trespasser and off-site resident, and the future on-site construction worker and off-site resident. Additionally, a conservative risk assessment was also conducted for a hypothetical residential groundwater use.

Soil at the Site is the primary source medium. Potential exposure pathways associated with direct surface soil contact for the current resident/trespasser exposure scenario include incidental ingestion, inhalation of dust, and dermal contact.

Exposure pathways associated with the future land-use scenario also have soil as the primary source medium, including both surface and subsurface soils exposed during construction activities. Potential exposure routes associated with the future land-use scenario include incidental ingestion, dermal contact, and inhalation of dust for the on-site construction worker. An off-site resident or trespasser would not be allowed on the Site during construction, therefore, direct contact exposure pathways would not be relevant for the off-site resident/trespasser in the future land-use scenario. Rather, dust in outdoor air may be carried off-site during construction activities; therefore, inhalation for the off-site resident is evaluated in the future construction scenario.

Shallow groundwater may be impacted by previous Site or off-site activities; however, because there is currently no use of the groundwater for drinking or domestic purposes, only a

hypothetical future groundwater use by the off-site resident was included in the *HHRA*. This person is assumed to be exposed to the shallow groundwater hypothetically developed as a potable source using residential exposure assumptions.

7.2 Exposure Point Concentrations and Chemicals

Based on the Site history, metals and SVOCs were analyzed in soil and groundwater. Exposure point concentrations used in the *HHRA* are the maximum detected concentration or the 95th UCL of the mean. Chemicals of potential concern (COPCs) for soil were determined using the following criteria:

1. Only data from samples identified as from the stockpile were evaluated in the HHRA. Samples taken from the stockpile but identified as representing native soil were not included.

2. If a chemical was not detected in any sample above the method detection limit, then it was not selected as a COPC.

3. If 20 samples or more were analyzed for a chemical and the chemical was detected in less than 5 percent of the samples, then it was not selected as a COPC.

4. If the chemical's maximum detected concentration was equal to or less than the chemical's background maximum detected concentration, then it was not selected as a COPC.

All other chemicals detected in soil were selected as COPCs and carried through the risk assessment.

COPCs in groundwater were determined using the following criteria:

1. If a chemical was not detected in any sample above the method detection limit, then it was not selected as a COPC.

2. If the chemical's maximum detected concentration was equal to or less than the chemical's background maximum detected concentration, then it was not selected as a COPC.

3. If a chemical is considered to be an essential nutrient (e.g., sodium) then it was not selected as a COPC.

All other chemicals detected in soil were selected as COPCs and carried through the risk assessment.

A detailed discussion of the soil and groundwater data and the selection of COPCs for the risk assessment, as well as summary tables, are presented in the *HHRA* (Appendix A).

7.3 Toxicity Values

Toxicity values and dermal absorption fractions from soil for each COPC, and their associated references, are presented in Table 8 of the *HHRA.* In general, guidance from OEHHA, USEPA's Integrated Risk Information System (IRIS), USEPA Region 9, 2004 Preliminary Remedial Goal (PRG) table, and USEPA Health Effects Assessment Summary Tables were used to select toxicity values for the COPCs. USEPA-recommended procedures were used to estimate the route-specific intake doses and selected exposure parameters for the complete or potentially complete exposure pathways identified.

The *HHRA* presents a detailed discussion of exposure route-specific intake doses for each exposure route evaluated in the *HHRA*, the methodology used to estimate the route-specific intake doses and the selected exposure parameters for the complete or potentially complete pathways identified.

7.4 Risk Characterization Summary

The risk characterization in the *HHRA* integrates the COPC selection, exposure assessment, and toxicity assessment to describe the risks to individuals in terms of the nature and likelihood of potential adverse health risks under both current and future land use conditions. The risk characterization process integrates exposure intakes and toxicity values to estimate both cancer risk and noncancer health effects.

The cancer risk is expressed as an increased probability of developing cancer as a result of a lifetime exposure. The excess lifetime cancer risk values are expressed in terms such as on-in-ten-thousand or one-in-a-million. Total cancer risk for a given receptor generally may involve multiple chemicals, exposure routes, and media. The route-specific risk is estimated by summing the excess cancer risks for all chemicals for that exposure route by simple addition. For multiple chemical or mixture exposures, the total risk for each medium is estimated by summing the excess cancer risks for all chemicals for each exposure route using simple addition. To be health protective, the lifetime excess cancer risks from various media are assumed to be additive, as well.

The potential for noncancer effects was evaluated by comparing estimated exposure level over a specific period with noncancer toxicity values derived for a similar exposure period. To assess the potential adverse noncancer effects resulting from exposure to contaminants, the route-specific and chemical-specific average daily dose (or concentration) was compared with the appropriate chronic reference does to arrive at a ratio known as the hazard quotient (HQ). The HQ is the ratio of the exposure level to the noncancer toxicity value. If the exposure level

exceeds the threshold (i.e., if HQ exceeds unity), there may be a concern for potential noncancer effects. The potential additivity of noncancer hazard due to exposure to multiple substances is quantified as a hazard index (HI), which is the sum or all possible chemical-specific HQs. The route-specific HI is estimated by summing the chemical-specific HQs using simple addition. For multiple chemical or mixture exposures, the total HI for each medium is estimated by summing the HIs for all chemicals for each exposure route using simple addition. To be health protective, HIs from various media are assumed to be additive, as well.

The risk and hazard estimates for all applicable human receptors were estimated in the *HHRA* using a conservative approach. Based on available soil data and the assumptions described in the *HHRA*, neither the current land-use nor the proposed future land-use scenario poses an unacceptable risk or hazard to off-site residents, trespassers, or construction workers. Additionally, the estimated HI for a hypothetical groundwater user is less than the threshold of concern. For this reason, based on the available data, neither soil nor groundwater at the Site is considered to present an unacceptable risk or hazard under the receptor scenarios evaluated in the *HHRA*.

7.5 Uncertainty Analysis

All human health risk assessments involve the use of assumptions, judgments, and incomplete data to varying degrees that may contribute to the uncertainty associated with the final risk estimates. Uncertainties may result from the use of assumptions or models in lieu of actual data and from the error inherent in estimating exposure parameters. Generally, the primary sources of uncertainty are associated with environmental sampling and analysis, selection of COPCs, exposure assessment, and toxicity assessment. The *HHRA* presents a detailed discussion of the effects of some of these potential uncertainties on the risk assessment.

Uncertainties may result in the potential overestimation or underestimation of receptor-specific risks. Based on the uncertainties discussed in the *HHRA*, it should not be construed as presenting an absolute estimate of risk associated with exposure to chemicals detected in soil or groundwater at the Site. The assumptions used in the HHRA provide a plausible estimate of the upper limit of risk. It is unlikely that the true risk would be much higher than the estimated risk, but it could very well be considerably lower, even approaching zero.

8.0 Ecological Screening Evaluation

The Northern San Joaquin Valley Environmental Management Branch of Caltrans performed an ecological screening evaluation based on recommendations made by DTSC. A field visit was conducted on November 2, 2007, by Caltrans staff. The site investigation addressed the three soil stockpiles and a walking survey of the area was conducted. Caltrans staff conducted an inventory of plants and animals at the Site, and evaluated habitat within a one-mile radius of the Site. The results of the Caltrans evaluation are contained in a Memorandum, dated April 16, 2009 (Appendix B) and are summarized below.

8.1 Site Characterization

As previously discussed, the soil stockpiles are isolated and surrounding land use is dominated by urban development (commercial, industrial, and residential). Each of the soil stockpiles is currently fenced. SR 99 runs in a northwestern-southeastern direction through the area. Properties located south of SP#1 and SP#2 consist of single-family residential subdivisions; to the north are numerous commercial businesses. Located directly west of SP#1 is the Caltrans right-of-way for the continuation of SR 132. Industrial and commercial developments are located north and east of SP#3.

The soil stockpiles were surveyed and found to be ruderal habitat. Plants common to these areas are adapted to frequent disturbance and typically consist of non-native species. This habitat is not suitable for most wildlife species due to its disturbed nature and lack of foraging, nesting, and breeding habitats. Introduced species are common in these areas. Within a one-mile radius of the Site, ruderal habitat as well as orchards, vineyards and fallow agricultural lands were identified. Wildlife species are unlikely to utilize these areas for habitat other than intermittent foraging or movement, especially by non-native species.

8.2 Biological Characterization

During the field visit, burrowing by small mammals such as the California ground squirrel and Botta's pocket gopher was observed at the Site. Several common bird species were also observed, including the brewer's blackbird, American crow, house sparrow, northern mockingbird, and mourning dove. Only common animal species were observed; no habitat supporting special-status species was observed at the Site or within a one-mile radius.

8.3 Pathway Assessment

The stockpiles are isolated and surrounded by urban development (commercial, industrial, and residential). No aquatic resources were identified at the soil stockpiles. Within a one-mile radius of the Site, several artificially created canals were observed. These canals are maintained

and provide minimal habitat for common plant and animal specials. No connectivity between these canals and the soil stockpiles was observed. Pathways for contamination were not observed, and the above factors would limit dispersal of contaminants to flora and fauna.

8.4 Qualitative Summary

According to the Memorandum, no habitat supporting special-status species was observed at the Site or within a one-mile radius of the Site, only common plant and animal species. Pathways for contamination were not observed and several site-specific factors would limit dispersal of contaminants to flora and fauna. In addition, no signs of contamination, such as dead specimens, were observed within the study area.

9.0 Community Profile

A draft Community Profile was developed by Caltrans and reviewed by DTSC. The community profile contained information as outlined in Exhibit 6-2 of the DTSC Public Participation Manual, including:

- A Site/Project Description, including location, surround land use, and demographics of the community
- A discussion of Local Awareness and Interest, including media coverage
- A Key Contact List and Mailing List for adjacent property owners and leasers/renters
- A discussion of key issues and concerns

Using information provided by Caltrans in the Community Profile, DTSC developed and distributed a Community Questionnaire, dated April 2006 (DTSC, 2006). Response to the Community Questionnaire should enable DTSC to determine the level of community interest, and determine appropriate community outreach activities to inform the community of the status of the project. DTSC may provide professional staff services to coordinate and conduct additional public participation activities with Caltrans in accordance with the DTSC Public Participation Manual, as needed. This may include such activities as arranging public meetings and workshops, and developing written response to public inquiry.

10.0 Conclusions and Recommendations

10.1 Summary and Conclusions

The primary source of potential contamination at the Site is barium-contaminated soil from the former FMC facility. The soil stockpiles were generated when SR 99 was constructed through a small area of the FMC facility that was purchased by the State of California. That area contained a portion of one of the FMC facility's evaporation ponds. Soil excavated from that area was stockpiled at its present location within the Caltrans right-of-way for the future SR 132/99 interchange. Based on Site history, other metals and semivolatile organic compounds (SVOCs) were also deemed to be a potential concern.

Shaw performed site investigation in 2006 to further characterize the soil stockpiles and compare their chemical contents relative to background conditions and established health goals, if necessary. Shaw also performed site investigation in 2006 to assess groundwater beneath the Site for potential water quality impacts relative to constituents of concern (COCs) in the soil stockpiles and to establish groundwater concentrations of COCs and selected other constituents. Results of the 2006 investigation identified COCs in the soil stockpiles, which included metals and SVOCs; only metals were detected in groundwater.

Data from the 2006 soil and groundwater investigations were integrated into a concurrent *HHRA* prepared by Shaw. The goal of the *HHRA* was to provide an estimate of the potential chronic health risks and hazards to persons exposed to COCs from the Site. Both residential and construction exposure scenarios were incorporated into the *HHRA*, providing estimates of risks or hazards from Site media to potential current and future human receptors. The potential human receptors of concern for soil included the current trespasser and off-site resident, and the future on-site construction worker and off-site resident. Additionally, a conservative risk assessment was also conducted for a hypothetical residential groundwater use.

The risk and hazard estimates for all applicable human receptors were estimated in the *HHRA* using a conservative approach. Based on available soil data and the assumptions described in the *HHRA*, neither the current land-use nor the proposed future land-use scenario poses an unacceptable risk or hazard to off-site residents, trespassers, or construction workers. Additionally, the estimated HI for a hypothetical groundwater user is less than the threshold of concern. For this reason, based on the available data, neither soil nor groundwater at the Site is considered to present an unacceptable risk or hazard under the receptor scenarios evaluated in the *HHRA*.

The Northern San Joaquin Valley Environmental Management Branch of Caltrans performed an Ecological Screening Evaluation based on recommendations made by DTSC. A field visit was

conducted on November 2, 2007, by Caltrans staff. The site investigation addressed the three soil stockpiles and a walking survey of the area was conducted. Caltrans staff conducted an inventory of plants and animals at the Site, and evaluated habitat within a one-mile radius of the Site.

The ecological screening evaluation revealed that no habitat supporting special-status species was observed at the Site or within a one-mile radius of the Site, only common plant and animal species. Pathways for contamination were not observed and several site-specific factors would limit dispersal of contaminants to flora and fauna. In addition, no signs of contamination, such as dead specimens, were observed within the study area.

10.2 Recommendations

The findings summarized above support a recommendation of no further action for the Site under the current and proposed future land-use scenarios. However, a number of institutional controls should be implemented, including:

- A land use covenant (deed restriction) to restrict future land-use at the Site.
- A soil management plan addressing on-site management of the soil stockpiles and characterization requirements for small quantities of soil that may be moved at the Site or removed from the Site.
- A notification procedure for informing DTSC prior to future construction activities involving use of the soil stockpiles in the SR 132/99 interchange project and a remedial action work plan.
- An operation and maintenance plan, including provisions for maintaining fencing around each of the soil stockpiles at the Site.

Documentation regarding these institutional controls should be submitted to DTSC.

11.0 References

Caltrans, 2007, Contract No. 06A1141, Task Order No. 19, dated June 29, 2007.

DTSC, 1999, *Preliminary Endangerment Assessment Guidance Manual*, dated June 1999.

DTSC, 2005, *Caltrans Modesto Soil Stockpile (State Route 99/132 Project), Caltrans/Department of Toxic Substances Control Interagency Agreement Task Order No. 10-43A0142-03: Department of Toxic Substances Control No. 03-T2641*, letter to Mr. Gerald H. White, Chief, Hazardous Waste Branch, Caltrans, District 6, dated April 8, 2005.

DTSC, 2006, *Community Questionnaire for the California Department of Transportation, Modesto Site,* dated April 2006.

GeoTrans, 2005, *Addendum to the Comprehensive Remedial Investigation Report, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California*, dated January 2005.

OEHHA, 2005, *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil,* dated January 2005.

Shaw, 2004a, *Heavy Metal Contamination, Preliminary Site Investigation Report, Modesto, California, State Route 132 at State Route 99, Stanislaus County, California,* dated June 1, 2004.

Shaw, 2004b, *Remedial Action Options Report, Modesto, California, SR132/SR99 Stockpiles, Modesto, California,* dated July 27, 2004.

PROJECT NUMBER	117725-A10
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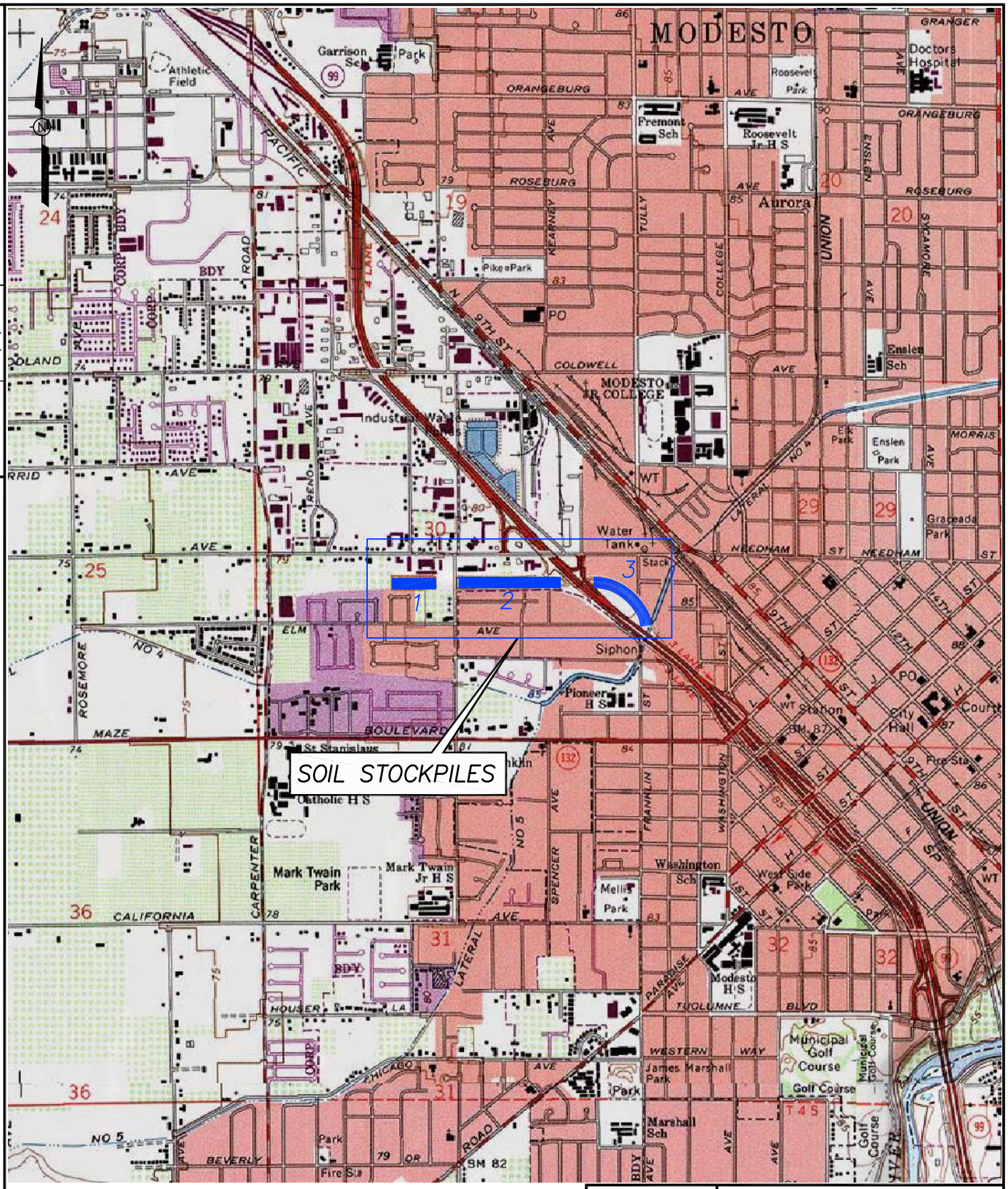

REFERENCE:
7.5' USGS TOPOGRAPHIC QUADRANGLE OF "SALIDA" CALIFORNIA; DATED 1987; SCALE = 1:25000

SCALE

0 600 1200 METERS

Shaw®

CALIFORNIA DEPARTMENT OF TRANSPORTATION
STATE ROUTE 99/132 PROJECT
MODESTO, CALIFORNIA
TASK ORDER 23

FIGURE 1

SITE LOCATION MAP

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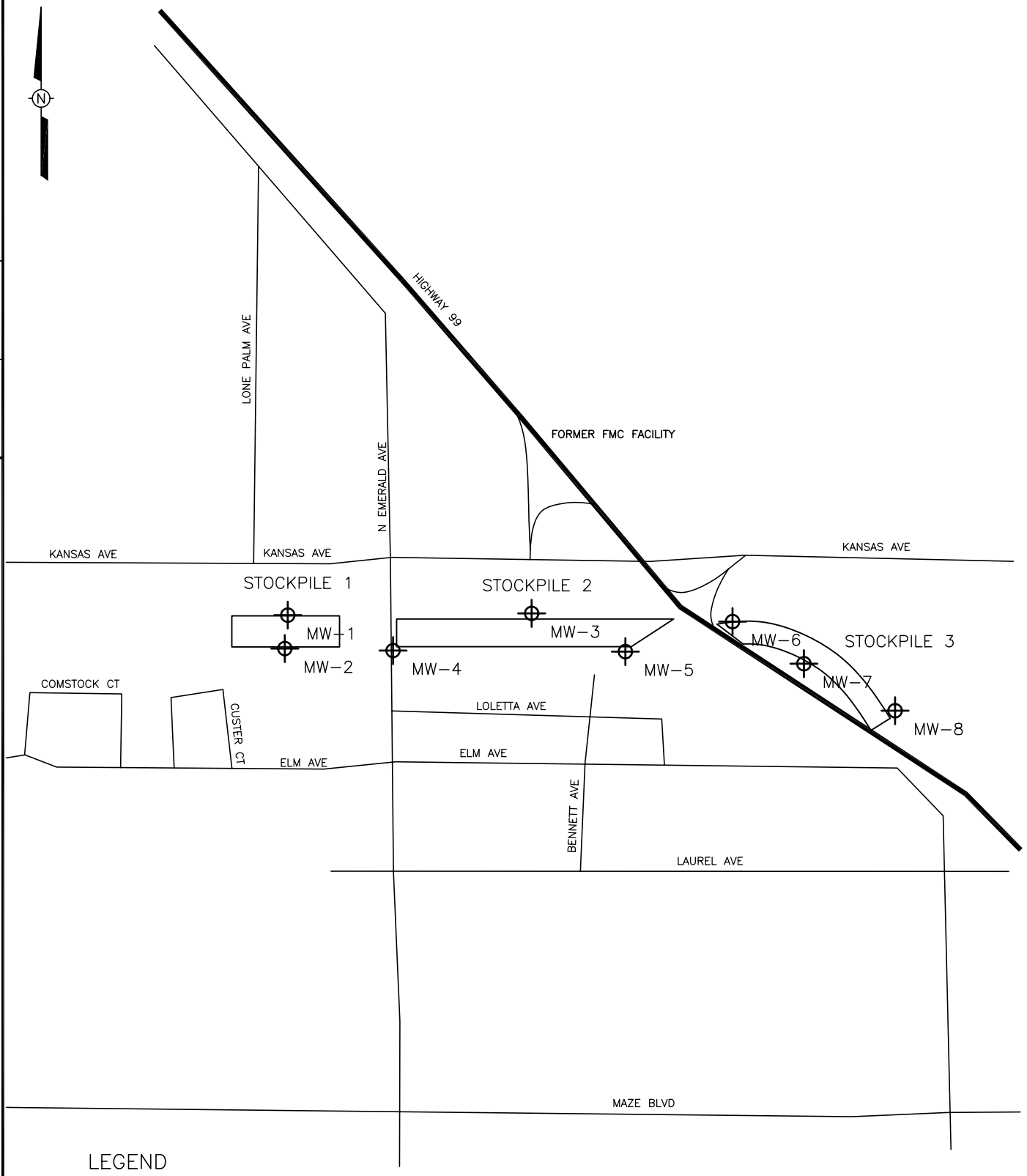
SCHAEFFER			



LEGEND

⊕ MONITORING WELL LOCATION

SCALE

0 800 1600 FEET

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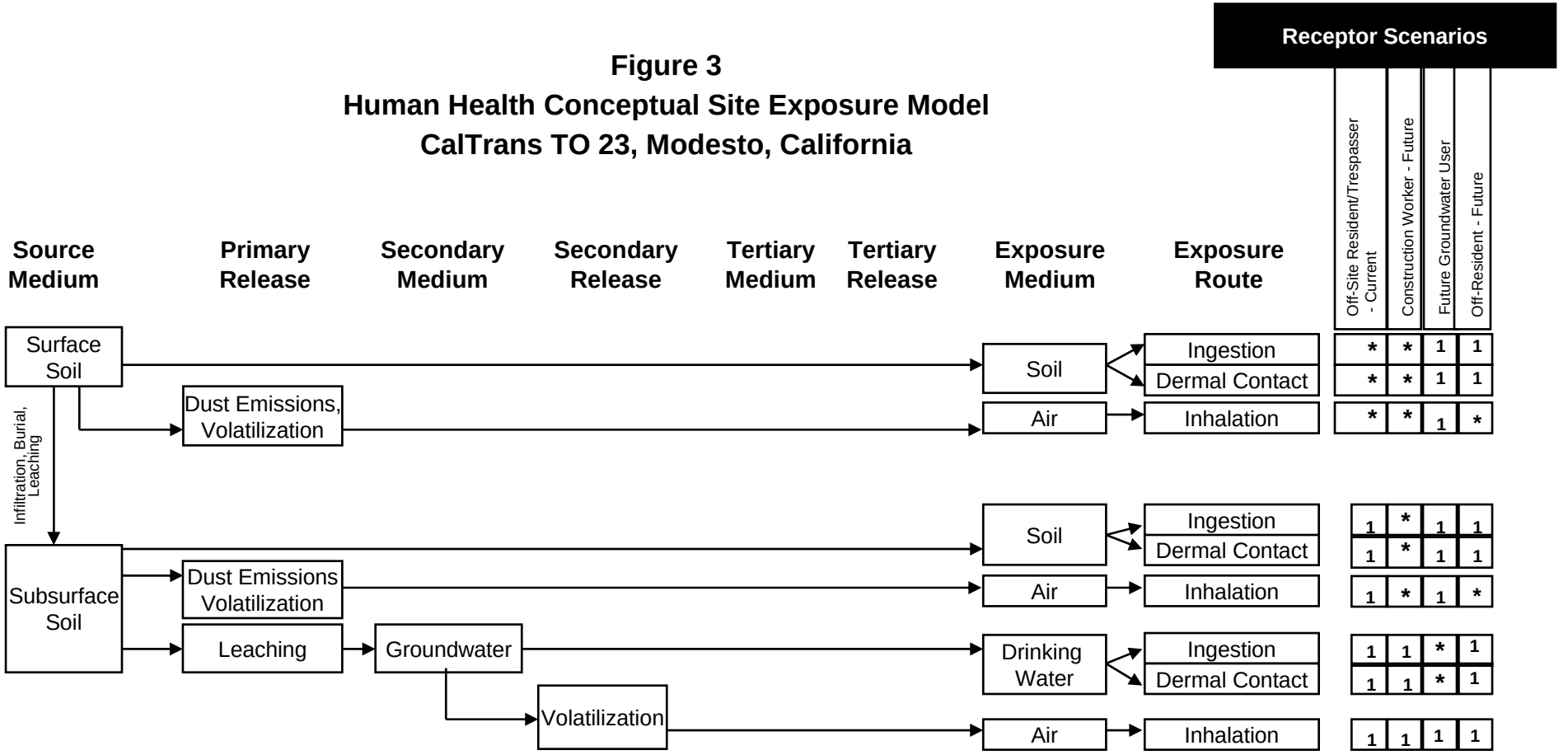
CALIFORNIA DEPARTMENT
OF TRANSPORTATION
STATE ROUTE 99/132 PROJECT
MODESTO, CALIFORNIA
TASK ORDER 35

FIGURE 2

WELL LOCATION MAP

Figure 3
Human Health Conceptual Site Exposure Model
CalTrans TO 23, Modesto, California



***** = Complete exposure pathway evaluated in the risk assessment.
1 = Incomplete exposure pathway.

Appendix A
Human Health Risk Assessment

Appendix B
Ecological Screening Evaluation