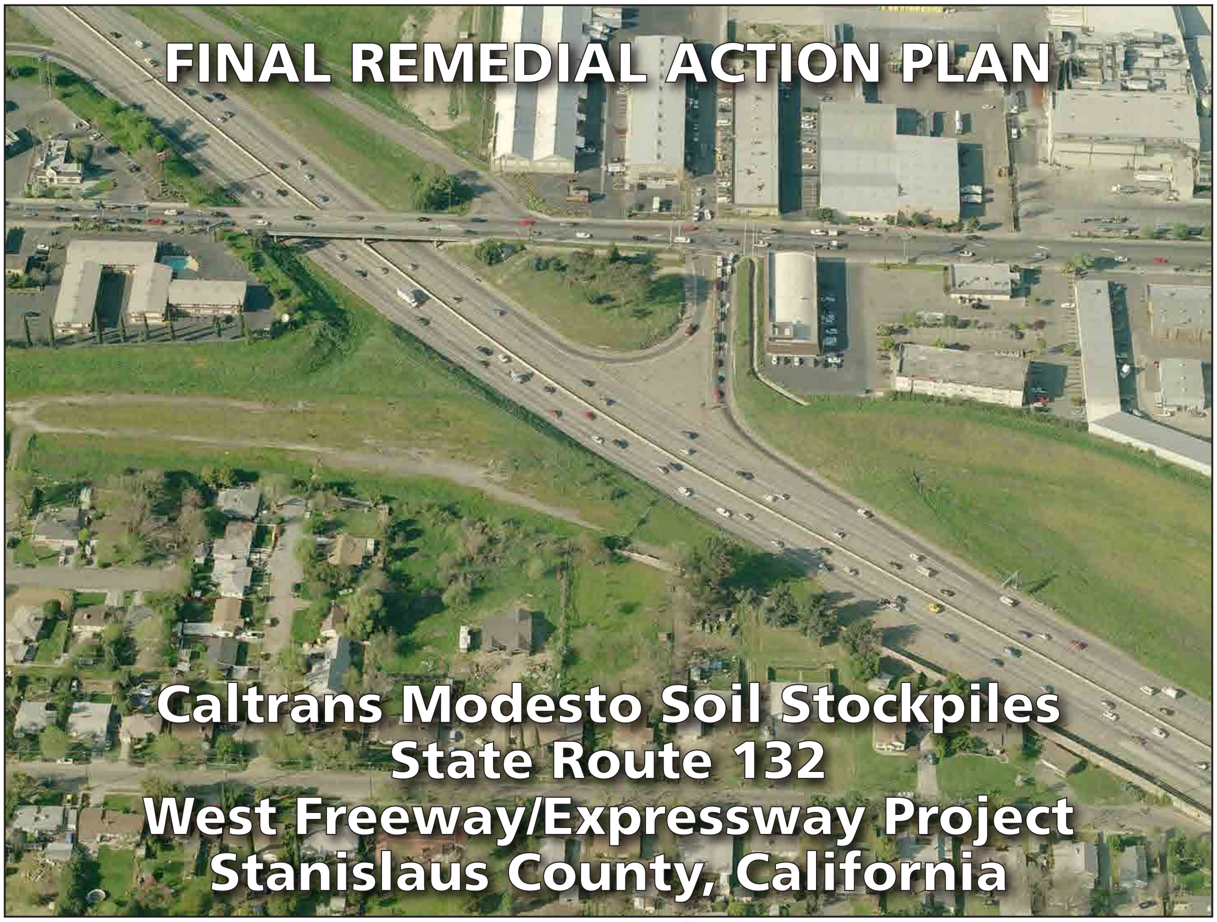

FINAL REMEDIAL ACTION PLAN

Caltrans Modesto Soil Stockpiles
State Route 132
West Freeway/Expressway Project
Stanislaus County, California

PREPARED FOR:

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 6
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PREPARED BY:

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GEOCON PROJECT NO. S1200-01-01
TASK ORDER NO. 1, EA 10-0X2700
CONTRACT NO 06A2184

MARCH 2018

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. S1200-01-01
March 14, 2018

Randy Adams, CEG
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826

Subject: FINAL REMEDIAL ACTION PLAN
CALTRANS MODESTO SOIL STOCKPILES
STATE ROUTE 132 WEST FREEWAY/EXPRESSWAY PROJECT
MODESTO, STANISLAUS COUNTY, CALIFORNIA

Dear Mr. Adams:

In accordance with the Interagency Agreement between the California Department of Toxic Substances Control (DTSC) and the California Department of Transportation (Caltrans) dated June 22, 2012, we are pleased to submit the enclosed Final Remedial Action Plan (RAP) for the Caltrans Modesto Soil Stockpiles (the Site) located south of the State Route (SR) 99/Kansas Avenue interchange in Modesto, Stanislaus County, California. The selected remedial alternative to mitigate the barium-containing (and other contaminants of concern) soil stockpiles is containment by incorporating the stockpiles as highway embankment fill and covering with pavement and/or clean fill during construction of the SR-132/SR-99 interchange portion of the planned SR-132 Project.

The October 27, 2014 Draft Final RAP and Draft Environmental Impact Report/Environmental Assessment were made available during a 59-day public comment period beginning on January 18, 2017 and during a public hearing held in Modesto on February 22, 2017. Finalization of this RAP considered comments received during the public comment period and public hearing.

Please call the undersigned if you have any questions regarding the Final RAP.

Sincerely,

GEOCON CONSULTANTS, INC.

Jim Brake, PG
Project Manager

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ACRONYMS AND ABBREVIATIONS

AIA	air impact assessment
ARAR	applicable or relevant and appropriate requirement
Cal-EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CDMG	California Division of Mines and Geology
CEG	Certified Engineering Geologist
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHHSL	California Human Health Screening Level
COPC	contaminant of potential concern
CVRWQCB	Central Valley Regional Water Quality Control Board
CSEM	Conceptual Site Exposure Model
DI	de-ionized water
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EIR/EA	Environmental Impact Report/Environmental Assessment
EPC	exposure-point concentrations
ESL	Environmental Screening Level
FMC	Food Machinery and Chemical Corporation
FS	feasibility study
GRA	general response action
HERO	Human and Ecological Risk Office
HI	hazard index
HHRA	Human Health Risk Assessment
HSP	health and safety plan
IA	Interagency Agreement
ISA	Initial Site Assessment
kg/m^3	kilograms per cubic meter
LUC	land use covenant
MCL	Maximum Contaminant Level
MDC	maximum detected concentration
µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
mg/m^3	milligrams per cubic meter
MID	Modesto Irrigation District
MSL	mean sea level
NCP	National Contingency Plan
NRCS	Natural Resources Conservation Service
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon

PEA	Preliminary Endangerment Assessment
PE	Professional Engineer
PG	Professional Geologist
PSI	Preliminary Site Investigation
PTR	Proven Technologies and Remedies
RAO	Removal Action Objective
RAOR	Remedial Action Options Report
RAP	Remedial Action Plan
RDIP	Remedial Design Implementation Plan
RL	reporting limit
ROW	right-of-way
RSL	Regional Screening Level
SFBRWQCB	San Francisco Bay Area Regional Water Quality Control Board
SJVAPCD	San Joaquin Valley Air Pollution Control District
SI	site investigation
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
SSI	Supplemental Site Investigation
STLC	Soluble Threshold Limit Concentration
StanCOG	Stanislaus Council of Governments
TBC	to be considered
TDS	total dissolved solids
TOC	top of casing
TSS	total suspended solids
UCL	upper confidence limit
USA	Underground Service Alert
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WET	waste extraction test
yd^3	cubic yard

FINAL REMEDIAL ACTION PLAN

EXECUTIVE SUMMARY

This Final Remedial Action Plan (RAP) was prepared on behalf of the California Department of Transportation (Caltrans) for the Caltrans Modesto Soil Stockpiles (the Site) located south of the State Route (SR)-99/Kansas Avenue interchange in Modesto, Stanislaus County, California. Caltrans has finalized the Environmental Impact Report/Environmental Assessment (EIR/EA) for the proposed SR-132 West Freeway/Expressway Project (the SR-132 Project), which was developed in coordination with Stanislaus Council of Governments (StanCOG). The Final EIR/EA was prepared in accordance and to comply with the California Environmental Quality Act (CEQA) with Caltrans as the lead agency. This RAP supplements the EIR/EA and therefore, the California Department of Toxic Substances Control (DTSC) and the Central Valley Regional Water Quality Control Board (CVRWQCB) in their capacity as oversight agencies for the RAP, are also responsible agencies for the EIR/EA.

The October 27, 2014 Draft Final RAP and Draft Environmental Impact Report/Environmental Assessment were made available during a 59-day public comment period beginning on January 18, 2017 and during a public hearing held in Modesto on February 22, 2017. Finalization of this RAP considered comments received during the public comment period and public hearing. Because significant changes were not required to the Draft Final RAP, DTSC requested submittal of this Final RAP for implementation following its approval of the Draft Final RAP.

The stockpiles were created in the early-1960s by importing soil from a Food Machinery and Chemical Corporation (FMC) facility that was located less than 500 feet north of the Site. FMC and its predecessors operated a chemical processing facility at that location from 1929 to approximately 1985. The facility processed barium and strontium minerals (barite and celestite) and other materials to produce a variety of industrial chemicals. From the early 1950s to the late 1970s, liquid wastes were discharged to seven unlined ponds at the FMC facility. During construction of SR-99, soil in and around one of the former FMC ponds was excavated and stockpiled in their current configuration within the current Caltrans right-of-way (ROW) for a planned SR-99/SR-132 interchange. This RAP summarizes the assessments of the contaminants and the recommendation and implementation of the selected remedial action.

Purpose of the RAP

The purpose of the RAP is to summarize in one document the results of characterization of contaminant impacts at the Site, an assessment of potential risks to human health and the environment associated with the impacts, the development of a remedial action alternative to reduce those risks, and to make this information available to the public for review and comment. This RAP provides the following specific information:

- A description of the Site's physical characteristics including location, size, configuration, its geologic, hydrogeologic, and geotechnical characteristics, stormwater runoff, and background soil conditions.
- The results of characterization to identify and assess the nature and extent of contaminants of potential concern (COPCs) at the Site.
- The results of a Human Health Risk Assessment (HHRA) and an HHRA Update for the Site performed based on COPC concentrations in the stockpiles.
- Applicable or relevant and appropriate requirements (ARAR) for implementation of the recommended remedial alternative.
- A summary of a Feasibility Study (FS) which evaluated potential remedial alternatives to address the COPCs. The FS has been reviewed and approved by the DTSC and CVRWQCB.
- A conceptual design for the recommended remedial alternative.
- Land use controls that would be required to limit land use on the Site.
- Monitoring that would be performed to ensure that the implemented remedial alternative continues to be effective.
- A schedule for implementation of the recommended remedial alternative.
- A Health and Safety Plan (HSP) for use during implementation of the selected remedial alternative.
- The measures taken to satisfy CEQA**.**
- Public participation efforts including public notices, fact sheets, public hearings, and public comment on the Final RAP.

Site Name and Location

Site Name: Caltrans Modesto Soil Stockpiles, Stockpiles #1, #2, and #3, and collectively "the Site."

Site Location: The stockpiles occupy a portion of Caltrans' right-of-way (ROW) approximately 350 feet south of the Kansas Avenue overcrossing of SR-99 in Modesto, Stanislaus County, California. The stockpiles extend approximately 2,500 feet west of SR-99 and approximately 500 feet east of SR-99.

Site Description

The Site consists of three separate soil stockpiles within Caltrans ROW, which were placed to be used for the planned SR-132 Project. The following is a summary of the configuration, orientation, size, and surrounding vicinity of each stockpile:

- **Stockpile #1** is located south of Kansas Avenue and west of Emerald Avenue. It is rectangular in shape, approximately 600 feet long in the east-west direction and 160 feet wide, with a flat top and sloped sides. Stockpile #1 has an estimated volume of approximately 34,000 cubic yards (yd^3). It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is undeveloped ROW, and to the east is an approximately 240 feet long undeveloped section of ROW and North Emerald Avenue.

- **Stockpile #2** is located south of Kansas Avenue, between Emerald Avenue and SR- 99. It is also rectangular, approximately 1,650 feet long in the east-west direction, 160 feet wide, and flat-topped with sloped sides. Stockpile #2 has an estimated volume of approximately 102,000 yd^3. It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is North Emerald Avenue, and to the east is SR-99.
- **Stockpile #3** is located south of Kansas Avenue and east of SR-99. It has a curvilinear shape extending northwest to southeast (concave to the southwest) with a length of approximately 1,100 feet and a width of approximately 120 feet. It has an estimated volume of approximately 24,000 yd^3. It is bounded by SR-99 to the south and west and commercial/light industrial development to the north and east. The Modesto Irrigation District (MID) Lateral #4 canal concrete box culvert extends beneath its southeastern end.

The stockpiles are enclosed within perimeter fencing and bordered by adjacent property boundary fencing/walls or structures. There are no operations on the stockpiles other than site maintenance, which consists of seasonal mowing of the vegetative (grass) cover on the stockpiles and maintaining the perimeter fencing. Groundwater beneath and in the vicinity of the stockpiles is currently monitored annually through a system of ten groundwater monitoring wells. Stormwater is monitored at seven locations (five adjacent and two background) around the stockpiles on a precipitation-dependent basis.

Site Characterization and Contaminants Involved

An Initial Site Assessment (ISA) was conducted for the SR-132 West Freeway/Expressway Project in 2003, which identified the stockpiles as potentially containing COPCs associated with the FMC facility. The ISA was followed by a Preliminary Site Investigation (PSI) in 2004 to characterize the stockpiles. The PSI identified the presence of barium in stockpile soil samples at concentrations exceeding commercial/industrial California Human Health Screening Levels (CHHSLs) and cadmium at concentrations exceeding the commercial/industrial CHHSL in Stockpiles #2 and #3.

Additional site investigation (SI) was performed in 2006 to further characterize the soil stockpiles, compare analytical results to background conditions and CHHSLs, and included the installation of eight groundwater monitoring wells to assess groundwater quality. The results of analysis of groundwater samples initially collected from the wells in June and October 2006 indicated that groundwater met drinking water standards (primary and secondary Maximum Contaminant Levels [MCLs]) for those constituents analyzed.

A HHRA was performed in 2007 for the COPCs in the stockpiles and groundwater using multiple exposure scenarios. Metals (notably barium) and polycyclic aromatic hydrocarbons (PAHs) were identified as the primary COPCs in the soil stockpiles and metals and general minerals (e.g. nitrate, total dissolved solids) as the primary COPCs in groundwater. Cadmium was not considered a COPC in the HHRA due to the lack of elevated cadmium concentrations identified during the 2006 SI. Strontium was also not considered a COPC in the HHRA since the maximum strontium concentration was more than two orders of magnitude less than the Unites States Environmental Protections Agency's (USEPA) residential Regional Screening Level (RSL) of 47,000 milligrams per kilogram (mg/kg). The HHRA concluded that the soil stockpiles do not pose an unacceptable risk or hazard to current or future offsite residents, trespassers, construction workers or hypothetical future shallow groundwater users.

In response to the HHRA, the DTSC requested additional toxicological and site information prior to making a final determination regarding risk or hazard posed by the COPCs in the stockpile soil. A Final Preliminary Endangerment Assessment (PEA) was prepared in 2009 providing the additional information requested by the DTSC. The DTSC concluded that the soil stockpiles, as managed by Caltrans, do not pose a risk to human health for Caltrans workers, trespassers, or residents adjacent to the stockpiles and that Caltrans should continue to limit access to Caltrans-authorized personnel, maintain the perimeter fence, not excavate, grade, remove, or add soil to the Site, and maintain the vegetative cover. They also commented that Caltrans should continue to maintain the groundwater monitoring system associated with the Site.

In 2012, Caltrans entered into a second interagency agreement (IA) with the DTSC to further address the soil in Stockpiles 1 through 3. This IA outlined tasks for additional site characterization, risk evaluation and cleanup level determination, preparation of an FS to evaluate remedial alternatives, the Final RAP to convey site information and remediation plans to the public for review and comment, the necessary CEQA documents, and to conduct public participation activities, quality assurance, and quarterly groundwater monitoring and reporting.

In conjunction with the planned SR-132 Project, groundwater monitoring was reinitiated and conducted bi-monthly from March 2012 to March 2013. Two additional groundwater monitoring wells were installed in May 2012 and incorporated into the monitoring program. From March 2013 to September 2014, groundwater monitoring was conducted on a quarterly basis. Since then, groundwater has been monitored annually.

The additional site characterization requested by DTSC and CVRWQCB in the IA was intended to fill potential data gaps including perimeter ROW fenceline stockpile soil sampling to assess potential offsite and vertical migration of contaminants, perimeter stockpile soil sampling to define the lateral stockpile limits to aid in consolidation during future construction of the SR-132 Project, and additional stockpile soil sampling in areas of elevated cadmium concentrations identified in Stockpiles 2 and 3 during the 2004 PSI. A Supplemental Site investigation (SSI) was performed in September 2012 to address these data gaps. Laboratory analysis of soil samples collected from “Fenceline Borings” and “Perimeter Borings” did not detect barium at concentrations exceeding residential or commercial CHHSLs. Strontium was detected at concentrations within the range of background and orders of magnitude below the residential RSL. Cadmium was not detected in any of the soil samples collected from the “Cadmium Borings” advanced in Stockpiles 2 and 3 in areas of elevated cadmium reported in the 2004 PSI.

In 2013 the 2007 HHRA was updated by incorporating soil analytical data generated from the fenceline, perimeter, and additional stockpile sampling and groundwater analytical data generated from bi-monthly sampling events. The SSI data collected in September 2012 and groundwater data collected between March 2012 and March 2013 were compared to the data used in the 2007 HHRA. The 2012 soil and groundwater data was found to be similar to that utilized in the 2007 HHRA and therefore did not increase the conservative risk estimates. The 2007 HHRA was found to still be valid with respect to exposure potential for the resident/trespasser, construction worker and offsite resident, and hypothetical shallow groundwater user. DTSC concurred with the findings of the HHRA Update.

Scope and Role of the Remediation

Based on the 2007 HHRA and 2013 update, the DTSC confirmed that the soil stockpiles do not pose a risk to persons on or in the vicinity of the stockpiles as long as the stockpiles are maintained by: continuing to maintain fencing and signage around the stockpiles, to not disturb soil in the stockpiles, to keep a vegetative cover, and to continue to monitor groundwater.

Proposed Remedial Alternative

Based on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) nine-criteria analysis performed in the FS, Alternative 4 - Containment is the recommended alternative. Containment of the stockpiles will be achieved by incorporating the stockpiles as fill in the construction of the SR-132/SR-99 interchange portion of the planned SR-132 Project. The SR-132 Project requires a significant amount of embankment fill and is the reason the stockpiles were placed on the Site in the early 1960s. The stockpile soil will be contained behind retaining walls and bridge abutments and beneath roadway pavement thereby preventing potential exposure to the soil and stormwater infiltration or erosion.

The project will be constructed in two phases - an interim progress phase to be completed by 2018 and ultimate build-out phase to be completed by 2028. The interim progress phase will consist of a two-lane roadway, which will be constructed over the southern portions of Stockpiles 1 and 2. During this phase, the northern portions of Stockpiles 1 and 2 will not be contained beneath roadways and behind retaining walls and bridge abutments, but will be graded for drainage and capped with a minimum 6- to 12-inch-thick vegetated, clean soil cap. The ultimate build-out will include complete containment of the stockpiles within the project behind retaining walls, bridge abutments, and beneath roadway pavement. The median between the eastbound and westbound lanes of SR-132 will be covered either by pavement or a synthetic liner and clean soil layer.

Stockpile 3 is planned to be entirely contained within the interim progress phase of the SR-132 Project. As much of Stockpile 3 as possible will be placed in the stockpile fill consolidation zone within the eastern abutment for the SR-132 bridge over SR-99. The remainder of Stockpile 3 will then be placed in the stockpile fill consolidation zone of Stockpile 2.

The primary factors which support containment as the preferred remedy are: (1) it is effective in providing long-term, overall protection of human health and the environment; (2) it is technically feasible; (3) it is cost-effective because funding is available for construction of the SR-132 Project; and (4) it will help minimize the potential for contaminants to migrate to groundwater or to be eroded by stormwater runoff.

Other Remedial Alternatives Considered

Other alternatives that were considered in the FS include:

- No action,
- Institutional controls, and
- Removal of the stockpiles and offsite disposal.

No action would provide the lowest level of overall protection of human health and the environment of the four alternatives considered. No action would have the lowest level of regulatory acceptance because of the lack of site management and monitoring and would likely have the lowest level of community acceptance due to the perceived threat to human health and the environment. This is the least costly of the alternatives and is the most implementable.

Institutional controls include the site management activities that DTSC stated would be necessary to ensure that the stockpiles in their current condition do not represent a risk to human health or the environment. Management includes limiting access to only Caltrans-authorized personnel, regularly inspecting and maintaining the perimeter fence, prohibiting any soil disturbing activities or placement of other soil on the Site, maintaining the current vegetative cover, and continuing to maintain the groundwater monitoring programs for the Site. Maintaining the institutional controls would provide a higher level of protection to human health and the environment than no action and has regulatory acceptance by the DTSC. Similar to no action, though, this alternative may not be acceptable to the community due to the perceived threat to human health and the environment. This alternative is the second lowest in cost and the second most implementable.

Removal of the stockpiles and disposal at an offsite landfill would provide the greatest degree of overall protection of human health and the environment and may be the most acceptable to the community. Short-term impacts would be the greatest with this alternative due to potential air quality and traffic impacts. Air emissions from soil removal equipment (e.g., graders, excavators, loaders) and trucking will be greatest with this alternative. This alternative would also have the highest cost of the four, and funding is not currently identified for removal. This alternative could be performed in compliance with State and Federal requirements. Although technically implementable, it is the least implementable of the four because with construction of the SR-132 Project and removal of the stockpiles, which were placed specifically for the project, they would have to be replaced with an even greater amount of clean soil fill in order to build the project. This would pose an impact to funding and delay in the construction of the project.

As an appendix to the EIR/EA for the proposed State Route 132 West Freeway/Expressway Project, the Draft Final RAP was made available to the public for a 59-day review and comment period. The Draft EIR/EA was available at public repositories including offices of Caltrans District 10 and Stanislaus Council of Governments, as well as the Stanislaus County Library. An online version was also available through the Caltrans District 10 website. Notification of the schedule of the public review and comment period was also made in local newspapers and a DTSC Community Update. The public was invited to review the Draft Final RAP and provide input during this time. The DTSC and CVRWQCB reviewed all comments and provided responses in a responsiveness summary. In addition, a public hearing was held during the 59-day public review and comment period to further describe the project, the remedy selection process, the selected remedy, and to hear community input. The place and schedule for the public hearing was also noticed in local newspapers, the DTSC Community Update was mailed to nearby residents and other interested parties, and made available through the DTSC and Caltrans websites.

1.0 INTRODUCTION

This Final Remedial Action Plan (RAP) was prepared on behalf of the California Department of Transportation (Caltrans) for the Caltrans Modesto Soil Stockpiles (the Site) located south of State Route (SR)-99/Kansas Avenue interchange in Modesto, Stanislaus County, California (Figure 1). Caltrans has finalized the Environmental Impact Report/Environmental Assessment (EIR/EA) in accordance with the California Environmental Quality Act (CEQA) for the proposed SR-132 West Freeway/Expressway Project (the SR-132 Project) that was developed in coordination with Stanislaus Council of Governments (StanCOG). Both the California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC) and the Central Valley Regional Water Quality Control Board (CVRWQCB) are responsible agencies for the EIR/EA for oversight and administration of regulatory requirements pertaining to contaminants in the stockpiles.

The SR-132 Project will result in the ultimate build-out of a four-lane expressway by 2028. An interim progress phase will include construction of the SR-132 West/6th Street and SR-132/East/5th Street extensions, two of four traffic lanes from east of SR-99 to North Dakota Avenue, the Carpenter Road interchange, and the SR-132 roadway structures across Emerald Avenue and SR-99 by 2018. The ultimate build-out phase will include highway widening to four traffic lanes, construction of structures to accommodate the roadway widening along SR-132, and the SR-99/SR-132 interchange with related improvements along SR-99 by 2028.

The stockpiles, portions of which contain elevated levels of barium, are planned to be contained within the project by utilizing them as embankment material for roadway construction, retaining wall backfill, and bridge abutments. It is anticipated that remedial and contour cut/fill grading will be necessary to achieve final finish grades and to properly consolidate and contain the existing soil stockpiles.

1.1 Purpose and Organization of the RAP

The purpose of this Final RAP is to describe the remedial action evaluation and selection process for the Site, explain the selected remedial action alternative and the reasons for the preference; and describe other remedial alternatives considered. The Final RAP is organized as follows:

- **Section 1.0 Introduction** - includes a description of the Site and its history with respect to the origin of the stockpiles, a summary of previous site characterization activities, and a description of site physical conditions including geologic, hydrogeologic, geotechnical characteristics, stormwater, and background soil conditions.
- **Section 2.0 Nature and Extent of Impacts** - summarizes the results of characterization to identify and assess the nature and extent of contaminants of potential concern (COPC) at the Site. A conceptual site exposure model (CSEM) depicting sources of COPCs, release mechanisms, exposure routes, and receptors is presented in this section.

- **Section 3.0 Remedial Action Objective** - summarizes a Human Health Risk Assessment (HHRA) and an HHRA Update for the Site performed based on COPC concentrations in the stockpiles. Applicable or relevant and appropriate requirements (ARAR) for implementation of the selected remedial alternative are also summarized.
- **Section 4.0 Summary of Feasibility Study** - summarizes a Feasibility Study (FS) which evaluated potential remedial alternatives to address the COPCs and selected the most appropriate one.
- **Section 5.0 Preliminary Remedial Design for Soil Remedy** - presents a conceptual design for the recommended remedial alternative.
- **Section 6.0 Land Use Controls** - summarizes land use controls that would be put in place to limit land use on the Site.
- **Section 7.0 Monitoring and Reporting** - describes monitoring that would be performed to ensure that the implemented remedial alternative continues to be effective.
- **Section 8.0 RAP Preparation and Implementation Schedule** - provides RAP preparation dates and a schedule for implementation of the recommended remedial alternative.
- **Section 9.0 Health and Safety Plan** - includes a Health and Safety Plan (HSP) for use during implementation of the recommended remedial alternative.
- **Section 10.0 CEQA** - summarizes the measures taken to satisfy CEQA**.**
- **Section 11.0 Public Participation** - describes public participation efforts including a Public Participation Plan prepared by the DTSC, public notices, fact sheets, public hearing, and public comment on the Final RAP.

This Final RAP has been prepared in general accordance with Appendix C2 (*Remedial Action Plan Sample*) of the DTSC's *Proven Technologies and Remedies Guidance, Remediation of Metals in Soil* dated August 29, 2008.

1.2 Site Description

The Site consists of three separate soil stockpiles within Caltrans right-of-way (ROW) located south of the SR-99/Kansas Avenue interchange, which are planned to be used for the SR-132 Project. The following is a summary of the configuration, orientation, size, and surrounding vicinity of each stockpile:

- **Stockpile #1** is located south of Kansas Avenue and west of Emerald Avenue. It is approximately 600 feet long in the east-west direction, 160 feet wide, and has an estimated volume of approximately 34,000 cubic yards (yd^3). It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is undeveloped ROW, and to the east is an approximately 240 feet long undeveloped section of ROW and North Emerald Avenue.
- **Stockpile #2** is located south of Kansas Avenue, between Emerald Avenue and SR- 99. It is approximately 1,650 feet long in the east-west direction, 160 feet wide, and has an estimated volume of approximately 102,000 yd^3. It is bounded by commercial/light industrial development to the north and single-family residential to the south. To the west is North Emerald Avenue, and to the east is SR-99.

- **Stockpile #3** is located south of Kansas Avenue and east of SR-99. It has a curvilinear shape extending northwest to southeast, concave to the southwest, with a length of approximately 1,100 feet and a width of approximately 120 feet. It has an estimated volume of approximately 24,000 yd^3. It is bounded by SR-99 to the south and west and commercial/light industrial development to the north and east. The Modesto Irrigation District (MID) Lateral #4 canal concrete box culvert extends beneath its southeastern end.

The stockpiles are enclosed within security fencing and bordered by adjacent property boundary fencing/walls or structures. The stockpiles, ROW boundaries, and surrounding vicinity are depicted on the Site Plan (Figure 2).

1.3 Site History

From the 1930s to 1970s, property beneath and northeast of the SR-99/Kansas Avenue Interchange was occupied by chemical processing facilities operated by Barium Products LTD, Westvaco Chlorine Products Corporation, and Food Machinery and Chemical Corporation (FMC). Ores and minerals including barite (barium sulfate) and celestite (strontium sulfate) were processed for use in greases, lubricating oil and pigment blanks. Sodium sulfide was generated as a by-product and sold as a caustic and reagent.

From the 1950s to the 1970s, liquid residue ("tailings") generated by FMC at this facility was discharged to unlined evaporation ponds. In 1961, the State purchased a 4.3-acre parcel in the southwestern portion of the FMC facility, including a portion of the ponds, for the construction of the SR-99 freeway through Modesto. Pond tailings and underlying soils from the FMC property along with native soils excavated south of the SR-99/Kansas Avenue interchange were placed to create the three stockpiles that exist today.

In order to establish the timing of placement of the stockpile material within the boundaries of Caltrans' ROW, aerial photographs from 1963 and 1967 (Figures 3a and 3b, respectively) were reviewed. The 1963 photograph shows grading/construction of SR-99 including the southwestern portion of the FMC property, interchange ramps at Kansas Avenue, and placement of Stockpiles 2 and 3. The Kansas Avenue overpass appears to have been completed. Haul roads to Stockpiles 2 and 3 were within Caltrans ROW. Adjacent property conditions included rural residential and agricultural property west of Emerald Avenue in the current location of Stockpile 1. Residential development was adjacent to the south of Stockpile 2. The areas north and northeast of Stockpiles 2 and 3 were rural residential, agricultural land, and commercial/industrial businesses.

The 1967 photograph shows that SR-99 north and south of the Kansas Avenue interchange had been completed, and Stockpiles 1, 2 and 3 existed essentially as they do today. Property conditions adjacent to Stockpile 1 consisted of rural agricultural property and recent residential subdivision development along the western half of the southerly stockpile boundary. Haul roads to Stockpile 1 were within Caltrans ROW.

1.4 Site Characterization

Shaw Environmental, Inc. (Shaw) conducted an Initial Site Assessment (ISA) for the SR-132 West Freeway/Expressway Project in 2003. The ISA identified a potential for the soil stockpiles within the SR-132 ROW to contain residual chemicals associated with the former FMC impoundments. Shaw then conducted a Preliminary Site Investigation (PSI) in 2004 to characterize the stockpiles. The PSI consisted of drilling 50 borings into the stockpiles, underlying native soil, and background soil from which they collected soil samples and had them analyzed for heavy metals, polycyclic aromatic hydrocarbons (PAH), nitrate, and pH. The analytical results indicated elevated barium concentrations in stockpile soil samples exceeding commercial/industrial California Human Health Screening Levels (CHHSLs). Cadmium concentrations exceeding the commercial/industrial CHHSL were also detected in soil samples collected from 8 of 25 borings in Stockpile 2 and from 2 of 10 borings in Stockpile 3.

In accordance with a DTSC/Caltrans 2006 Interagency Agreement (IA) and the requirement to complete a Preliminary Endangerment Assessment (PEA), Shaw conducted additional site investigation (SI) in 2006 to further characterize the soil stockpiles and compare the analytical data to background conditions and CHHSLs. They also installed eight groundwater monitoring wells in order to assess groundwater quality. The 2004 and 2006 Shaw investigations found that the stockpiles are primarily comprised of layered, poorly graded sand and silty sand similar to underlying native alluvial deposits of the Modesto formation. The average maximum stockpile fill thickness was determined to be approximately 20 feet. Groundwater was encountered in the project vicinity at depths between 30 and 40 feet (below natural grade) with flow toward the southeast. The results of analysis of groundwater samples collected from the eight monitoring wells in June and October 2006 indicated that groundwater met drinking water standards (primary and secondary Maximum Contaminant Levels [MCLs]) for those constituents analyzed.

Shaw prepared an HHRA in 2007 for the COPCs in the stockpiles and groundwater using multiple exposure scenarios. Metals (notably barium) and PAHs were identified as the primary COPCs in the soil stockpiles and metals and general minerals (e.g. nitrate, total dissolved solids) as the primary COPCs in groundwater. For the purposes of the HHRA, Shaw did not identify cadmium as a COPC due to the lack of elevated cadmium concentrations reported for soil samples collected during the 2006 SI. Shaw also did not identify strontium as a COPC in the HHRA since the maximum strontium concentration of 231 milligrams per kilogram (mg/kg) reported in the Shaw 2004 PSI is more than two orders of magnitude less than the Unites States Environmental Protections Agency's (USEPA) residential Regional Screening Level (RSL) of 47,000 mg/kg. There is no CHHSL for strontium. The results of the HHRA indicated that the soil stockpiles do not pose an unacceptable risk or hazard to current or future offsite residents, trespassers, construction workers or hypothetical future shallow groundwater users.

In response to the HHRA, the DTSC issued an August 2007 letter that requested additional toxicological and site information prior to making a final determination regarding risk or hazard posed by the COPCs in the stockpile material. Shaw prepared a Final PEA and a Response to Comments document in 2009 to summarize the findings of previous reports prepared for the soil stockpiles and to provide the additional information requested by the DTSC. In a letter dated December 17, 2009, the DTSC responded to the Final PEA stating that:

> *"DTSC finds that the soil stockpiles, as currently managed by Caltrans on Caltrans property, do not pose a risk to human health for: 1) Caltrans workers who access the fenced site to conduct mowing operations, conduct fence repairs, or other routine activities; 2) trespassers; and 3) residents adjacent to the stockpiles. Until such time that the State Route 132/99 Interchange project is constructed and/or the final disposition of the soil stockpiles is determined, Caltrans should continue to manage the soil stockpiles by: 1) limiting access to Caltrans authorized personnel; 2) inspecting and maintaining the chain-link fence; 3) prohibiting any activities involving excavation/grading, off-site removal of soil, or placement of other soil on the Site; and 4) maintaining the current grade and vegetative cover. Caltrans should also maintain the existing groundwater monitoring system associated with the Site."*

In conjunction with activities associated with the SR-132 Project, groundwater monitoring was reinitiated and conducted bi-monthly from March 2012 to March 2013. From March 2013 to September 2014, groundwater was monitored on a quarterly basis. Since then, groundwater has been monitored annually.

Caltrans and DTSC, in cooperation with the CVRWQCB, entered into a second IA dated June 22, 2012, to further address the soil in Stockpiles 1 through 3. This IA outlined tasks for additional site characterization, risk evaluation and cleanup level determination, an FS to evaluate remedial alternatives, preparation of a RAP, preparation of the necessary CEQA documents, public participation activities, quality assurance, and quarterly groundwater monitoring and reporting.

Upgradient wells MW-9 and MW-10 were installed immediately south of Kansas Avenue and west and east of SR-99 (Figure 2), respectively, in May 2012. Groundwater samples were initially collected in these wells in June 2012 then incorporated into subsequent bi-monthly sampling rounds.

The analytical results from the 2012 and 2013 groundwater monitoring events are similar to the results from 2006, with primary analytes reported at concentrations less than California MCLs.

On July 26, 2012, a meeting was held with representatives from Geocon, Caltrans, DTSC, and CVRWQCB to review existing site data and discuss potential remedies to address human health exposure and environmental impacts associated with the barium-impacted soil stockpiles. DTSC and the CVRWQCB requested additional sampling to fill potential data gaps in the following areas:

1. Perimeter ROW fenceline stockpile soil sampling to assess potential offsite and vertical migration of contaminants.
2. Perimeter stockpile soil sampling to define the lateral stockpile limits to aid in consolidation during future construction of the SR-132 Project.
3. Additional stockpile soil sampling in areas of elevated cadmium concentrations identified in Stockpiles 2 and 3 during the Shaw 2004 PSI.

Geocon performed a Supplemental Site investigation (SSI) in September 2012 to address these data gaps. Laboratory analysis of 97 soil samples collected from 35 “Fenceline Borings” and 28 “Perimeter Borings” did not detect barium at concentrations exceeding residential or commercial CHHSLs. Barium concentrations in the surface soil samples ranged to a maximum of 4,300 mg/kg. Barium concentrations were consistently lower in the bottom of boring soil samples (2 to 5 feet) collected from the Fenceline Borings compared to those reported for the surface samples. Strontium was detected at concentrations up to 110 mg/kg for the Fenceline Boring surface soil samples, which is within the range of background and orders of magnitude below the residential RSL of 47,000 mg/kg. Cadmium was not detected in any of the soil samples collected from the “Cadmium Borings” advanced in Stockpiles 2 and 3 in areas of elevated cadmium reported in the Shaw 2004 PSI.

1.5 Previous Removal Actions Taken

To date, the only removal action taken on the Site has been excavation and landfill disposal of a portion of Stockpile 3 as part of Caltrans’ rehabilitation of the off-ramp to Kansas Avenue to improve traffic safety and meet current design standards. The highway safety improvement project included widening the off-ramp shoulder areas and associated drainage features. Shoulder widening on the east side of the off-ramp included construction of a retaining wall against the existing Stockpile 3 embankment and laying back the embankment slope.

Geocon previously completed eight direct-push borings and eleven hand-auger borings within the embankment area. Barium was detected in each sample at concentrations ranging from 34 to 1,600 mg/kg, all less than the residential and commercial/industrial CHHSLs for barium of 5,200 and 63,000 mg/kg, respectively. Based on this data, data previously presented in the PEA, and review by DTSC, the excavated soil stockpile materials were designated for offsite disposal as non-hazardous soil to an accepting licensed landfill facility. The DTSC conveyed their finding that offsite management of the soil from Stockpile 3 did not pose a threat to human health or the environment in a letter dated August 30, 2012.

The *Stockpile 3 Excavation Monitoring Plan* completed in June 2012 described procedures for air monitoring and verification of completed stockpile excavations during construction of the highway off-ramp improvements. Approximately 2,800 yd^3 of the Stockpile 3 soil embankment were excavated over ten days between September 7 and 26, 2012. The excavated stockpile material was directly loaded into covered trucks for transport to the Forward Class II landfill facility in Manteca, California, under non-hazardous waste manifests. Dust suppression provided by the Caltrans contractor during the stockpile excavation and loading activities consisted of pre-soaking and water spray during the stockpile excavation activities. A Geocon project scientist, working under the direct supervision of a California Professional Geologist (PG), oversaw the excavation activities. The individual performing the oversight also prepared and maintained daily field logs that documented the daily quantities of materials excavated. The project geologist provided a determination when the planned construction excavation limits within Stockpile 3 had been completed, exposing native soil of the Modesto formation (Geocon, June 2012).

Ambient perimeter air was monitored during Stockpile 3 excavation and loading activities to document total airborne particulate concentrations in accordance with the air monitoring plan. The results of air monitoring aided in assessing the effectiveness of the contractor's dust control measures.

Air monitoring tasks included:

- Documenting and photographing the locations of air monitoring stations;
- Monitoring daily meteorological forecast to anticipate onsite wind direction and speed; and
- Verifying that downwind direct-read, real-time particulate counter readings (pDR-1200 monitors) did not exceed the Fence Line Total Dust Action Level of 4.0 milligrams per cubic meter (mg/m^3).

In addition to the data logging programmed in the real-time monitors, field personnel checked each real-time air monitoring instrument hourly to ensure proper operation and battery capacity and also recorded the time-weighted average airborne dust readings hourly.

Direct read (pDR-1200) and laboratory air sample results for the project indicated that airborne levels of lead and barium were well below levels of concern during excavation activities at Stockpile 3. The removal activities are documented in the *Stockpile 3 Excavation Summary Report, Modesto Ramp Rehabilitation Project, State Route 99 Kansas Avenue Northbound Off-Ramp, Modesto, California,* dated March 15, 2013 (Geocon, March 2013).

1.6 Site Geology and Hydrogeology

The following subsections provide a summary of the regional and local topographic, geologic, soil, and hydrogeologic conditions associated with the Site.

1.6.1 Topography

The United States Geological Survey (USGS) *Salida, California,* 7.5-minute topographic map indicates the Site is located within Township 3 South, Range 9 East, with Stockpiles 1 and 2 in the southern half of Section 30, and Stockpile 3 in the southwestern quarter of Section 29, Mount Diablo baseline and meridian. Based on contour lines on the topographic map, with the exception of the SR-99 Kansas Avenue underpass, the vicinity surrounding the Site is relatively flat-lying at an elevation of approximately 84 feet above mean sea level (MSL), and a low westerly-trending surface gradient (USGS, 1987). The stockpiles range in height from approximately 2 to 20 feet above the surrounding ground surface.

1.6.2 Geologic and Soil Conditions

The Site is located within the northern San Joaquin Valley of California's Great Valley geomorphic province. The San Joaquin Valley is an asymmetrical structural trough bound by the Sacramento Valley to the north, the Coast Ranges to the west, and the Sierra Nevada to the east and south. The base of the Sierra Nevada slopes westward beneath the San Joaquin Valley to its greatest depth near the valley's western margin. The San Joaquin Valley has been filled with several thousand feet of sedimentary deposits eroded from the Sierra Nevada, which include deposits of sands, silts, clays, and gravels from western-flowing drainages and their tributaries. Sediments in the Modesto region were deposited primarily by the Stanislaus and Tuolumne Rivers to the north and south of the Site, respectively.

The Site is underlain by sediments of the late Pleistocene to early Holocene age Modesto formation, which were derived from granitic rocks of the Sierra Nevada and deposited in an alluvial environment. The Modesto formation is composed primarily of sand, silt, and silty sand, with lesser amounts of laterally discontinuous clay and silty clay. The thickness of the Modesto formation is variable, with a regional thickness of approximately 100 feet in the vicinity of the Site (California Division of Mines and Geology [CDMG], 1962).

The Modesto formation is underlain by Pleistocene age sands and silts of the Riverbank and Turlock Lake formations, and pediment gravels of the North Merced formation. Tertiary age pediment gravels of metamorphic origin, and clays, tuffs, and ash of volcanic origin underlie these formations, with Cretaceous age marine sandstones and shale of the Great Valley sequence beneath the Tertiary formations at regional depths of approximately 3,000 feet (CDMG, 1962).

Shaw's SI Report *(Shaw,* 2007a and Appendix A of the HHRA) indicates that the onsite stockpile materials were placed over the native Modesto formation sediments and that there appeared to be some undulation in the original ground surface. The stockpile boring logs and associated cross-sections in Shaw's report indicate that the Modesto formation is situated beneath the onsite stockpiles at depths ranging from approximately 2 feet near the western end of Stockpile 1 to approximately 20 feet near the western end of Stockpile 3 (Shaw, 2007a). Shaw described the native sedimentary materials encountered in the Modesto formation as primarily consisting of silt, silty sand, and sand, with lesser amounts of laterally discontinuous clay and silty clay. Shaw also indicated that fill materials encountered in the stockpiles were "generally similar" to the native soils; however, distinct layers of gray and bluish-gray non-native materials were encountered in the stockpile materials (Shaw, 2007a).

According to the Unites States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) website (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx), the soil onsite primarily consists of Dinuba fine sandy loam to a depth of approximately 10 inches that was derived from granitic sediments deposited in an alluvial environment. The Dinuba fine sandy loam is described as moderately well-drained and underlain by sandy loam to a depth of approximately 28 inches, and very fine sand and silt loam to a depth of approximately 60 inches. The NRCS website database also indicates that native soil on the approximate southern one-third of the Site beneath Stockpile 1 consists of Modesto loam to a depth of approximately 12 inches that was also derived from granitic sediments deposited in an alluvial environment. The Modesto loam is described as moderately well-drained and underlain by clay to a depth of approximately 35 inches, sandy clay loam to a depth of approximately 55 inches, and silty clay to a depth of approximately 62 inches.

1.6.3 Geotechnical Characteristics

In June 2012, Kleinfelder performed a geotechnical investigation of the stockpiles. The investigation included nine hollow-stem auger borings to a depth of 41.5 feet below the surfaces of the stockpiles. As reported in their September 2012 *Final Geotechnical Design Report,* stockpile soil was encountered to depths of approximately 10 to 20 feet at each boring location. The soil conditions were reported as loose to very dense, interbedded layers of silty sand, sandy silt with some layers of hard sandy clay. Debris consisting of asphalt, metal and brick at depths between 3 and 10 feet in boring A-12-002 advanced on the eastern portion of Stockpile 1 was also reported. Groundwater was not encountered to the maximum depth explored.

Kleinfelder presented the following specific conclusions and recommendations to assist in design and construction of the proposed SR-132 highway improvements in the vicinity of the soil stockpiles:

- Embankment foundation soil is adequate to support the proposed embankment without adverse consequences.
- Final unpaved slopes should be 2:1 or flatter and be protected from erosion by proper management of drainage, planting drought resistant vegetation, and necessary maintenance.
- No surface water should be allowed to pond near the tops of slopes or discharge over the slope face.
- Remove any debris materials encountered in the stockpile fill soil during planned highway construction excavations.

Kleinfelder concluded that the soil encountered in the borings is "geotechnically adequate for design and significant removal and replacement should not be necessary" to support the planned highway improvements including placement from 5 to 20 feet of additional fill material on top of the stockpiles and the construction of retaining walls along the length of Stockpiles 1 and 2 (Kleinfelder, 2012).

1.6.4 Hydrogeologic Conditions

The Site is situated within the Modesto Subbasin of the San Joaquin Basin Hydrologic Study Area. The Modesto Subbasin is situated between the Stanislaus and Tuolumne Rivers to the north and south, respectively, and is bounded by the Sierra Nevada foothills to the east, and the San Joaquin River to the west. The San Joaquin Basin Hydrologic Study Area includes the southern two-thirds of the Great Valley. Movement of groundwater within the San Joaquin Valley is generally from the flanks of the valley toward the axis of the trough beneath the western side of the valley, then subsequently north toward the Sacramento – San Joaquin Delta. In the San Joaquin Valley groundwater occurs in unconfined and semi-confined aquifers (California Department of Water Resources [DWR], 1980).

The San Joaquin Valley is an area of substantial groundwater withdrawal and recharge due to municipal, industrial, and agricultural use. Wide fluctuations in groundwater levels are not uncommon due to variations in annual rainfall, municipal pumping, and irrigation practices. The *Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 2010* issued by the DWR indicates a regional depth to groundwater of approximately 40 feet beneath the Site, with a generally south-southeasterly flow direction.

The hydrogeology of the FMC facility, approximately 1,100 feet north of the Site, has been characterized by several studies since the early 1980s. GeoTrans, Inc's report: *Addendum to Comprehensive Remedial Investigations Report*, dated January 2005, provides the following description of the hydrogeology associated with FMC facility:

> *"The site is underlain by laterally discontinuous and unconsolidated sand and silty sand associated with the Modesto and Riverbank Formations. First-encountered groundwater is approximately 30 feet below ground surface (bgs) under confined to semi-confined conditions. A deeper aquifer is present at a depth of 165 feet bgs and separated from the upper zone by a blue clay aquitard. The upper water bearing unit has been divided into two zones: a shallow zone from first encountered groundwater to 120 feet bgs and a deeper zone from 140 feet bgs to the top of the aquitard. Groundwater flow within the upper zone is toward the southeast under a gradient of 0.002 ft/ft."*

As described in Section 1.4, Shaw installed eight groundwater monitoring wells adjacent to the three stockpiles in June 2006. Each well was installed into unconsolidated sand, silty sand, and silt layers within the Modesto formation underlying the Site (Shaw 2007b). The wells were completed within the shallow zone of the upper aquifer as described by GeoTrans. The lithology encountered in the well borings included interbedded (laterally discontinuous) sands, silts, and clays. Shallow zone groundwater beneath the stockpiles was encountered at a depth of approximately 35 feet under unconfined to semi-confined conditions. Shaw determined that groundwater flow is toward the southeast at a gradient of approximately 0.001. The shallow aquifer conditions beneath the Site and the adjacent FMC facility are similar and representative of the local hydrogeologic conditions (Shaw 2007b).

In April 2017, depth to groundwater at the Site ranged from 35.52 (MW-1) to 40.73 (MW-7) feet below top of casing (TOC). Based on the groundwater elevation data, the groundwater flow is toward the east-southeast at an average gradient of 0.0007, which is generally consistent with historical flow.

1.6.5 Stockpile Stormwater

Shaw performed stormwater monitoring for the soil stockpiles in March 2006 in general accordance with their *Final Surface Water Sampling and Analysis Plan* (Shaw, January 2006). Seven stormwater runoff samples were collected from constructed impoundments during a qualifying rain event (visible runoff and 72 hours of prior dry weather). Shaw reported that they did not observe stormwater flowing away from the Caltrans ROW. The samples were analyzed for dissolved metals, PAHs, nitrate, sulfate, and sulfide.

With the sole exception of an elevated barium concentration reported for one stormwater sample collected from the northwestern side of Stockpile 3 (sample SW03), the stormwater samples did not contain target analytes exceeding MCLs or determined site background levels. Barium was reported at a concentration of 2,000 micrograms per liter (µg/l) in sample SW03 exceeding the MCL of 1,000 µg/l. Barium in the six other stormwater samples ranged from 16 to 190 µg/l. Shaw concluded that the elevated barium concentration reported for sample SW03 was isolated and that runoff in that area was confined to Caltrans ROW. Based on these results and due to site topography, vegetation and limited rainfall events, DTSC concluded that stormwater was not a chronic exposure issue. Therefore, surface water was not considered as a pathway in the HHRA.

Geocon prepared an addendum to the Shaw SAP to resume stormwater sampling at the soil stockpiles. The addendum identified revised sampling locations including ponding that was observed at the western end of Stockpile 2 adjacent to Emerald Avenue during a rain event on November 28, 2012.

Stormwater was most recently sampled on March 24, 2017. However, background samples could not be collected because of insufficient amount of water at the collection locations. During the previous sampling event on December 15, 2016, stormwater samples were collected from four locations adjacent to the stockpiles and two background locations away from the stockpiles and analyzed for dissolved metals, chloride, nitrate as nitrogen, sulfate, sulfide, total alkalinity, bicarbonate alkalinity, and carbonate alkalinity, total dissolved solids (TDS), and total suspended solids (TSS). The results of this monitoring event were presented in a report by Geocon dated January 16, 2017 (Geocon, January 2017). Analysis results were generally consistent with background values; with the exception of barium for a runoff sample collected adjacent to the south side of Stockpile 2.

1.7 Background COPC Concentrations

Shaw assessed background concentrations of COPCs during the 2006 SI for comparison to COPC concentrations in the stockpiles. Background soil samples were collected from what is reported as undeveloped and relatively undisturbed ground west of Stockpile 1. Eight soil borings were advanced to depths of 15 feet, and soil samples were collected at depths of 5, 10, and 15 feet. Shaw reported that the soil encountered in the eight background borings was predominantly sand with varying amounts of silt and clay.

The background soil samples were analyzed for inorganics, PAHs, and other inorganics (e.g., nitrate, sulfate, etc.). Shaw calculated 95th percentile upper confidence limits (UCL) for inorganics to establish local background concentrations for the Site. The 95th percentile UCLs could not be calculated for the infrequently detected constituents (e.g., beryllium, cadmium, and mercury) due to small population sizes, so arithmetic means for those constituents were calculated instead. For inorganics that were not detected, a concentration of one-half the detection limit was used as the background concentration. Shaw reported that the background concentrations of metals calculated for undisturbed soil near the stockpiles were in the general range as those determined for the FMC property.

Four background samples collected from various depths were also analyzed for PAHs, which were not detected (Shaw, 2007a).

2.0 NATURE AND EXTENT OF IMPACTS

This section describes the nature and extent of COPCs in the stockpiles.

2.1. Conceptual Site Exposure Model

Shaw prepared a CSEM as part of their HHRA (Shaw, 2007c). The CSEM identifies primary sources of COPCs, exposure routes, receptor scenarios, and identifies whether they are “complete” or “incomplete.” The CSEM concluded that the offsite resident and trespasser were the current human receptors. Future receptors during the project would include the future construction worker and future offsite resident.

Their CSEM is shown on Figure 4. The CSEM shows that potential exposure routes for the current resident/trespasser exposure scenario include incidental ingestion, inhalation of dust, and dermal contact. Exposure routes for the future land use scenario would include incidental ingestion, dermal contact, and inhalation of dust for the construction worker.

An offsite resident or trespasser would not have access to the Site during construction; therefore, direct-contact exposure pathways would not be relevant for the resident/trespasser. However, dust could be carried offsite during construction activities. Therefore, Shaw evaluated inhalation for the offsite resident for the future construction scenario.

2.2 Soil Impacts

As described in Section 1.4, the nature and extent of COPCs in the stockpiles have been characterized through several investigations including the PSI conducted by Shaw in 2004, the SI in 2006, and Geocon’s SSI in September 2012. The results of these investigations are summarized below.

2.2.1 Shaw 2004 PSI

Shaw collected 194 stockpile soil and 49 native soil samples (soil from beneath the stockpiles) from 50 direct-push borings advanced through the soil stockpiles in January 2004 and, as described in Section 1.7, they also collected eight “background” soil samples from four borings completed in assumed non-impacted areas. Each soil sample was analyzed for metals including antimony, arsenic, barium, chromium, iron and strontium. Selected soil samples were further analyzed for PAHs, nitrate and pH.

Shaw identified barium as the only metal detected at elevated concentrations of concern and as the primary COPC (Shaw, 2004). Barium was detected at maximum concentrations of 1,730 mg/kg for Stockpile 1, 60,700 mg/kg for Stockpile 2, and 44,900 mg/kg for Stockpile 3. Barium concentrations reported for the eight background soil samples ranged from 57 to 888 mg/kg.

PAHs were not detected in 125 stockpile soil, native soil, or background soil samples analyzed. Nitrate was detected at a maximum concentration of 310 mg/kg in 42 of 54 stockpile soil, native soil, and background soil samples analyzed, though not at concentrations of concern. Reported soil pH values ranged from 6.6 to 11.2.

In May 2004, 86 of the stockpile soil samples and 24 of the native soil samples that were collected in January 2004 were reanalyzed for metals. The original analysis data and the reanalysis data were reported together in the July 2004 *Remedial Action Options Report* (RAOR) (Shaw, 2004). The results of the additional analysis did not identify metals other than barium at concentrations of concern in Stockpiles 2 and 3. However, barium was reported as having been detected in several samples from Stockpiles 2 and 3 at concentrations three to five times higher than were reported for the same samples in February 2004. This increase in reported concentrations occurred mainly with those samples that had the highest barium concentrations to begin with in February 2004. No explanation was provided by the lab or Shaw for the reporting differences. One possibility may be that the material in the stockpiles with the highest concentrations of barium may also have a great degree of heterogeneity such that a sample aliquot taken from one portion of the sample and analyzed may have a much different barium concentration than an aliquot from another portion of the same sample. However, if heterogeneity were the reason for the variability in concentrations, it would be expected then that the variability would manifest itself in both increased and decreased concentrations. In this case there is a strong bias towards large increases in concentrations from the February 2004 results to the May 2004 results, with very few, smaller magnitude decreases. Other possible explanations may be related to laboratory errors.

Lead and arsenic were detected in all three stockpiles at concentrations exceeding background values. As previously discussed, elevated cadmium concentrations exceeding the commercial/industrial CHHSLs were detected in soil samples collected from Stockpiles 2 and 3 in January 2004.

2.2.2 Shaw 2006 SI

Shaw completed additional soil stockpile characterization activities in May 2006 as reported in their SI Report (Shaw, 2007a, and Appendix A of HHRA). They collected 165 stockpile soil and 89 native soil samples from 51 borings advanced through the stockpiles. Additionally, 24 native soil samples were obtained from eight background borings advanced in Caltrans ROW west of Stockpile 1. Each soil sample was analyzed for total metals. Selected soil samples were further analyzed for soluble barium and lead by the waste extraction test (WET and de-ionized [DI] water-WET), PAHs, and total and soluble (DI-WET) nitrate/sulfate/sulfite.

Total Metals Analysis Results

Antimony, selenium and silver were not detected in any of the 278 soil samples analyzed. Beryllium, cadmium, mercury, molybdenum and thallium were detected in the stockpile soil samples at low concentrations. Arsenic, chromium, cobalt and copper were detected in the stockpile soil samples at concentrations slightly exceeding background concentrations. Barium, lead, nickel, vanadium and zinc were detected in the stockpile soil samples at concentrations considerably higher than background values. Barium, the primary COPC, was detected at maximum concentrations of 130 mg/kg in Stockpile 1, 64,000 mg/kg in Stockpile 2, and 72,000 mg/kg in Stockpile 3. Barium concentrations reported for the background soil samples ranged from 17 to 120 mg/kg.

Soluble Metals Analysis Results

Thirty-three stockpile soil samples were analyzed for WET and DI-WET soluble barium. Soluble barium concentrations ranged from 39 to 2,300 milligrams per liter (mg/l), 28 of which exceeded the Title 22 California Code of Regulations (CCR) Soluble Threshold Limit Concentration (STLC) for barium of 100 mg/l. Soluble (DI-WET) barium concentrations ranged from 1.8 to 220 mg/l, nine of which exceeded the STLC. The Title 22 criteria cited above for the evaluation of WET and DI-WET analyses applies to non-barite barium compounds. Shaw noted that the barium compounds present at the Site were primarily barite (barium sulfate), and as a result, the Title 22 evaluation criteria are not strictly applicable to the Site.

Only two stockpile soil samples contained total lead concentrations exceeding 50 mg/kg (California hazardous waste threshold for requiring WET soluble testing) at concentrations of 150 and 1,500 mg/kg. WET soluble lead was detected in these two samples at 2.9 and 5.7 mg/l, respectively, and DI-WET soluble lead at 0.07 and 0.1 mg/l, respectively.

Nitrate, Sulfate, and Sulfide Analysis Results

Sixty-nine soil samples were analyzed for nitrate, sulfate and sulfide. No regulatory screening levels exist for these compounds. Nitrate was detected in the stockpile soil samples at concentrations within the range of background. Sulfate was detected in the stockpile soil samples at concentrations considerably higher than background and appears to correspond to samples with high barium concentrations. Only one stockpile soil sample contained detectable sulfide. DI-WET soluble nitrate concentrations ranged from 0.2 to 2.6 mg/l in 28 of 33 soil samples analyzed, DI-WET soluble sulfate from 0.5 to 14 mg/l in 32 of 33 soil samples analyzed, and DI-WET soluble sulfide was not detected in the 33 soil samples analyzed.

PAHs were detected at low concentrations ranging from 11 to 21 micrograms per kilogram (µg/kg) in 3 of 58 stockpile soil and native soil samples analyzed. PAHs were not detected in the background soil samples.

Shaw utilized the results of the 2006 SI in for the HHRA and summarized the results in the PEA.

2.2.3 Geocon 2012 SSI

Geocon completed an SSI in September 2012, which consisted of advancing 68 soil borings and collecting and analyzing soil samples to address potential stockpile and native soil data gaps to update the risk exposure scenarios from the 2007 HHRA prior to regulatory approval of the SR-132 Project. The SSI consisted of following:

- Advancing 35 "Fenceline Borings" at stockpile perimeter/fenceline locations adjacent to residential and commercial/industrial development to assess potential offsite and vertical migration of contaminants. Soil samples were collected from the surface and at maximum boring depths ranging from 3 to 5 feet and analyzed for Title 22 metals and strontium.
- Advancing 28 "Perimeter Borings" at stockpile perimeter and end locations to define the lateral stockpile limits to aid in consolidation during future highway construction. The surface soil sample collected from each 3-foot-deep boring was analyzed for barium.
- Advancing five "Cadmium Borings" in the vicinity of Shaw's 2004 PSI borings where soil samples were collected and reported to have elevated cadmium concentrations. Soil samples were collected from the Cadmium Borings at the surface and at 5-foot intervals thereafter to the maximum boring depths ranging from 11 to 22 feet. Each soil sample was analyzed for barium and cadmium.

Fenceline Borings

None of the metal concentrations reported for the Fenceline Boring soil samples exceeded California hazardous waste thresholds. With the exception of arsenic (within the range of site-specific background), none of the reported metal concentrations exceeded residential CHHSLs. With the exception of barium and lead, the remaining metals concentrations were generally within the range of the site-specific naturally occurring background levels. Barium was detected in each soil sample at concentrations ranging from 140 to 4,300 mg/kg for the surface soil samples and 42 to 680 mg/kg for the deepest soil sample obtained from the Fenceline Borings. At each boring location, the reported barium levels decreased with depth. The majority of the deeper soil samples contained barium within the range of background (47 to 110 mg/kg for 5-foot-deep background soil samples). Surface soil samples collected from five borings located along the north side of Stockpile 2 adjacent to commercial/industrial development contained the highest barium concentrations greater than 1,000 mg/kg. None of the reported barium concentrations exceeded residential or industrial CHHSLs of 5,200 and 63,000 mg/kg, respectively.

Perimeter Borings

Barium was detected in each soil sample collected from the Perimeter Borings at concentrations ranging from 76 to 1,600 mg/kg. The majority of the perimeter surface samples contained barium up to 300 mg/kg. Elevated barium concentrations between 710 and 1,600 mg/kg were detected in surface soil samples obtained from borings at the east end of Stockpile 2 and southwest side of Stockpile 3. None of the reported barium concentrations exceeded residential or industrial CHHSLs.

Cadmium Borings

Barium was detected in each soil sample obtained from the Cadmium Borings at concentrations ranging from 58 to 130,000 mg/kg. Cadmium was not detected at concentrations exceeding the laboratory reporting limit (RL) of 1.0 mg/kg for each soil sample. The results of the Shaw 2004 PSI identified elevated cadmium concentrations (exceeding the industrial CHHSL for cadmium of 7.5 mg/kg) for eleven soil samples collected from Stockpiles 2 and 3 with corresponding elevated barium concentrations (25,800 to 196,000 mg/kg). Cadmium was not detected at concentrations greater than 1.0 mg/kg for all 348 soil samples analyzed during the Shaw 2006 SI and the Geocon 2012 SSI, including 19 soil samples with reported elevated barium concentrations between 25,000 and 130,000 mg/kg. The Shaw 2004 PSI data (provided by Sparger Technology, Inc.), Shaw 2006 SI data (Creek Environmental Laboratories, Inc.), and the Geocon 2012 SSI data (Advanced Technology Laboratories) were generated by three different analytical laboratories. Based on the cumulative cadmium data, it appears the Shaw 2004 PSI cadmium data is neither reproducible nor reliable and represents false positives possibly as result of sample interference/dilution effects due to the associated high barium concentrations.

One soil sample obtained from a Stockpile 2 Cadmium Boring was analyzed for petroleum hydrocarbons and PAHs based on field indicators of potential impacts. Gasoline-range organics were not detected at a concentration exceeding the RL of 1.0 mg/kg. Diesel-range organics were detected at a concentration of 120 mg/kg, slightly higher than the 2008 residential/industrial Environmental Screening Level (ESL) established by the San Francisco Bay Area Regional Water Quality Control Board (SFBRWQCB) of 83 mg/kg. Petroleum organics concentrations were compared to ESLs because there are no CHHSLs or other regulatory screening levels for petroleum. The ESL of 83 mg/kg for diesel-range organics was the lowest ESL based on potential leaching to groundwater - the direct-exposure ESLs for residential and industrial land use were 110 and 450 mg/kg, respectively. Oil-range organics were detected at a concentration of 82 mg/kg, less than the 2008 residential ESL of 370 mg/kg. PAHs 2-methylnaphthalene, fluorene and phenanthrene were detected at concentrations ranging from 23 to 45 µg/kg, significantly less than their respective 2008 residential/industrial ESLs.

The results of the Fenceline and Perimeter Boring soil sample analytical data does not suggest lateral or vertical migration of soil containing metals (notably barium) at concentrations exceeding State and Federal residential human health screening levels (or in the case of arsenic, site-specific background levels) along the stockpile perimeters and adjacent property fencelines. The 1963 and 1967 aerial photographs (Figures 3a and 3b) show that transport and placement of barium-impacted soil materials in Stockpiles 2 and 3 occurred within Caltrans ROW.

Cadmium was not detected in any of the soil samples collected from the Cadmium Borings advanced in Stockpiles 2 and 3 where elevated cadmium was identified in the Shaw 2004 PSI. Cadmium is therefore not considered a COPC for the project site. The results of the SSI satisfied regulatory directives to address the remaining potential environmental assessment data gaps and were utilized to update the 2007 HHRA (Geocon 2013 HHRA Update).

2.3 Groundwater Impacts

Shaw installed eight groundwater monitoring wells adjacent to the stockpiles in May and June 2006 as reported in the May 2007 *Site Investigation Report, Groundwater Assessment* (Shaw 2007b and Appendix B of HHRA). The results of analysis of groundwater samples collected from the eight monitoring wells in June and October 2006 show that the concentrations of COPCs that were analyzed did not exceed drinking water standards (MCLs).

Caltrans reinitiated groundwater monitoring activities in March 2012 as part of the SR-132 Project. To date, Geocon completed bi-monthly groundwater monitoring events in March, May, July, September and November 2012, and January and March 2013. From March 2013 to September 2014, groundwater was monitored on a quarterly basis. Since then, groundwater has been monitored annually.

Upgradient wells MW-9 and MW-10 immediately south of Kansas Avenue and west and east of SR 99 were installed and incorporated into subsequent sampling events beginning in June 2012.

3.0 REMEDIAL ACTION OBJECTIVE

Site characterization revealed the presence of COPCs in soil at the Site. This section summarizes Shaw's evaluation of COPC concentrations through an HHRA, describes the update of the HHRA using 2012 data, describes the Remedial Action Objective (RAO) for the Site, discusses the ARARs related to remediation, and states the cleanup goal for the project.

3.1 Summary of the 2007 HHRA

The 2007 HHRA is included as Appendix A of the PEA (Shaw, 2009). The risk characterization in the HHRA integrated the selected COPCs, exposure assessment, and toxicity assessment to describe risks to individuals (receptors) in terms of the nature and likelihood of potential adverse health risks for current and future land uses. Shaw's risk characterization integrated exposure intakes and toxicity values to estimate both cancer risk and non-cancer health effects for the various land use scenarios. Using the available soil data from the investigations of the stockpiles and the assumptions described in the HHRA, the HHRA indicated that neither the current land use nor the proposed future land use scenario pose an unacceptable risk or hazard to Caltrans workers entering the Site for mowing, for trespassers, or for adjacent residents. Additionally, the estimated non-cancer hazard index (HI) for a hypothetical groundwater user is less than the threshold of concern. Therefore, 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.

Three groups of receptors are considered in the HHRA - a current offsite resident/trespasser, a future construction worker, and a future (during construction) offsite resident. The estimated cancer risk, non-cancer HIs, and blood lead concentrations for each receptor group are summarized in the following subsections.

3.1.1 Current Offsite Resident and Trespasser

The 2007 HHRA evaluated the current offsite resident and trespasser for exposure to the COPCs in soil of Stockpile 1 through incidental ingestion, dermal contact, and dust inhalation. The exposure pathway for the offsite resident would mainly be via inhalation while the trespasser could be exposed through all three pathways. The calculated cancer risk and non-cancer HI for the current offsite resident and trespasser receptors exposed to surface soil on Stockpile 1 is 8E-8 and 4E-2, respectively. The estimated excess cancer risk of 8E-8 is much less than the generally used, conservative criterion of 1E-6 (one in one million excess cancer risk) and the estimated HI for non-cancer effects is well below the threshold of 1.

The health risk related to lead in Stockpile 1 estimated in the HHRA uses the maximum detected concentration of lead in Stockpile 1 surface soil in the LeadSpread model. LeadSpread did not indicate that an offsite resident or trespasser would have a blood lead concentration greater than 10 micrograms per deciliter (µg/dL) in the 95th or 99th percentile. Therefore, lead in surface soil of Stockpile 1 does not pose an unacceptable hazard to a current resident/trespasser.

The calculated cancer risk and non-cancer HI for the offsite resident/trespasser receptor exposed to surface soil on Stockpile 2 is reported in the 2007 HHRA as 1E-5 and 0.1, respectively. While the total estimated non-cancer HI is below the threshold of 1, the total estimated cancer risk exceeds the general risk target of 1E-6 for residential exposures. This cancer risk estimate was driven by the large contribution from arsenic in surface soil. The arsenic cancer risk estimate is 1.45E-5 for the offsite resident/trespasser based on the 95th percentile UCL of arsenic in Stockpile 2 of 1.63 mg/kg. However, the background arsenic 95th percentile UCL of 1.15 mg/kg resulted in an estimated cancer risk of 1.15E-5, which is very similar to that for arsenic in Stockpile 2. Therefore, arsenic in surface soil of Stockpile 2 is not included in the final total risk estimate for Stockpile 2. The revised cancer risk estimate, with arsenic excluded, is 1E-7. Additionally, the estimated HI for non-cancer effects is below the threshold of 1. Therefore, surface soil from Stockpile 2 does not pose an unacceptable risk or hazard to a current resident/trespasser receptor.

The assessment of health risk related to lead in Stockpile 2 as reported in the 2007 HHRA uses the 95th percentile UCL for lead in Stockpile 2 surface soil of 30 mg/kg. The results indicate that all percentiles of adults and children would have blood lead concentrations less than 10 µg/dL. Therefore, lead in Stockpile 2 surface soil does not represent an unacceptable hazard.

Shaw evaluated the current offsite resident/trespasser for exposure to COPCs in soil of Stockpile 3 through incidental ingestion, dermal contact, and dust inhalation. The COPCs in Stockpile 3 surface soil are not considered to be carcinogens; therefore, they were not estimated as a cancer risk. The estimated non-cancer HI for the offsite resident/trespasser receptor exposed to surface soil on Stockpile 3 was 0.02, which is well below the threshold of 1.

Shaw also evaluated the health risk related to lead in Stockpile 3 using the 95th UCL for lead of 6.7 mg/kg in the LeadSpread model. LeadSpread did not indicate that offsite residents or trespassers would have a blood lead concentration greater than 10 µg/dL. Therefore, lead in surface soil of Stockpile 3 does not pose an unacceptable hazard to a current resident/trespasser.

3.1.2 Future Construction Worker

Shaw evaluated the future construction worker receptor for exposure to COPCs in soil in the future construction soil zone (depths of 0 to 20 feet) through incidental ingestion, dermal contact, and dust inhalation. The cumulative excess lifetime cancer risk was calculated as 9.2E-7, which is below the 1E-06 cancer risk criterion. The cumulative non-cancer HI was calculated to be 0.4, which is less than the threshold of 1.

Shaw also evaluated the health risk related to lead using the 95th percentile UCL for lead in the future construction soil zone of 54 mg/kg. The results indicate that blood lead concentrations would be less than 10 µg/dL for the pica child. Because the pica child exposure is more conservative than a construction worker's exposure, it is presumed that a construction worker would not have an unacceptable exposure either. Therefore, lead in soil is not considered to pose an unacceptable hazard to construction workers.

3.1.3 Future Offsite Resident

Shaw evaluated the future offsite resident for exposure to COPCs in dust produced from the future construction work (estimated to include 60 days of construction). The excess lifetime cancer risk was calculated to be 6E-10, which is well below the 1E-06 cancer risk criterion. The calculated cumulative non-cancer HI of 0.017 is also well below the threshold of 1.

Shaw also evaluated the health risk related to lead using the LeadSpread model, which indicated that an onsite pica child exposed to the 95th UCL lead concentration would not exceed 10 µg/dL. Shaw indicated that because the offsite resident would only be potentially exposed to soil through dust during the proposed future construction work, the estimated blood lead concentration would be much less than that estimated for the pica child. Additionally, the default lead in respirable dust concentration is 1.5 micrograms per cubic meter (µg/m^3) in the LeadSpread model. As calculated using the maximum lead concentration of 1,500 mg/kg from soil (from depths of 0 to 20 feet) multiplied by the offsite dust concentration of 9.95E-8 kilograms per cubic meter (kg/m^3), the resulting respirable dust concentration is 0.15 µg/m^3, well below the default value.

3.1.4 Hypothetical Future Shallow Groundwater User

Shaw evaluated the health risk for a hypothetical future user of shallow groundwater beneath the Site. According to the results of a well survey, no one within a 1-mile radius is using the shallow aquifer as a source of drinking water. Shaw calculated health risks from ingestion and dermal contact using the maximum detected concentrations (MDC) from two groundwater sampling events in 2006 as the exposure-point concentrations (EPC). The resulting cumulative noncancer hazard estimate is 0.9, less than the threshold of 1. For lead, the maximum concentration detected in a groundwater sample was 3.4 µg/l, which is less than the Federal action level of 15 µg/l. Therefore, lead in groundwater does not appear to present an unacceptable hazard.

3.2 HHRA Update

Geocon updated the 2007 HHRA by incorporating soil analytical data generated from the fenceline, perimeter, and stockpile sampling as presented in the revised *Supplemental Site Investigation* dated March 1, 2013, and groundwater analytical data generated from bi-monthly sampling events. The COPC EPCs that Shaw utilized in the 2007 HHRA were compared to the supplemental soil data collected in September 2012 and groundwater data collected between March 2012 and March 2013. The EPCs utilized in the 2007 HHRA are the MDCs for the selected COPCs for each exposure scenario with the exception of the Stockpile 2 Current Exposure Assessment which utilized the 95th percentile UCLs for the selected COPCs. This information was used to evaluate the validity of the 2007 HHRA cancer risk and non-cancer hazard estimates. The following sections summarize the EPC comparisons and risk/hazard evaluations for each exposure scenario.

3.2.1 Stockpile 1 Current Exposure Assessment

Eight metals (barium, beryllium, chromium, cobalt, copper, lead, mercury and nickel) reported for five surface soil samples from the 2006 SI were used as the COPCs for Stockpile 1 in the 2007 HHRA. The MDCs for these metals detected in surface soil samples collected from the September 2012 Fenceline Borings and Perimeter Borings (first values in brackets) are slightly higher as compared to the 2007 HHRA EPCs (second values in brackets) with relative concentrations as follows: barium (240 vs. 130 mg/kg), copper (24 vs. 13 mg/kg), and lead (17 vs. 12 mg/kg). Zinc was detected at an MDC of 120 mg/kg in the 2012 surface soil samples, exceeding the background MDC of 44 mg/kg. Cadmium was detected in one 2012 surface soil sample at 0.26 mg/kg, slightly above the reporting limit of 0.25 mg/kg and less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in each 2012 surface soil sample with an MDC of 61 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 8E-8 and 0.04, respectively, for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 1. Because the 2012 metal concentrations are of the same order of magnitude as those used in the 2007 HHRA and that none of the 2012 metal detections exceeded respective residential CHHSLs or RSLs, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 1. The 2007 HHRA calculated excess cancer risk is orders of magnitude less than the conservative criterion of 1E-6 and the estimated non-cancer HI is orders of magnitude less than the threshold of 1.

3.2.2 Stockpile 2 Current Exposure Assessment

The 95th percentile UCLs for seven metals (arsenic, barium, copper, lead, molybdenum, nickel and zinc) detected in 33 surface soil samples collected during the 2006 SI were selected as the COPCs for Stockpile 2 in the 2007 HHRA. The 2007 HHRA also used the MDC for chromium (divided as chromium III and VI). Of these metals, barium, copper and zinc were detected at higher concentrations in the surface soil samples collected from the September 2012 Fenceline and Perimeter Borings compared to the concentrations detected in the 2006 SI and used in the 2007 HHRA. Specifically barium had an MDC of 4,300 mg/kg in the 2012 samples vs. 1,100 mg/kg for the 2006 SI, copper had an MDC of 41 mg/kg in 2012 vs. 29 mg/kg in 2006, and zinc had an MDC of 200 mg/kg in 2012 vs. 89 mg/kg in 2006.

Cadmium was detected in one 2012 surface soil sample at 0.42 mg/kg, which is less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in each of the 2012 surface soil samples, with an MDC of 110 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 1E-7 (background arsenic not considered) and 0.1, respectively, for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 2. Because the 2012 metal concentrations are the same order of magnitude as those used in the 2007 HHRA, and none of 2012 metal detections exceeded respective residential CHHSLs or RSLs, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 2. The 2007 HHRA calculated excess cancer risk is less than the conservative criterion of 1E-6, and the estimated non-cancer HI is an order of magnitude less than the threshold of 1.

3.2.3 Stockpile 3 Current Exposure Assessment

Shaw selected the MDCs for three metals (barium, lead and molybdenum) reported for 13 surface soil samples from the 2006 SI as the COPCs for Stockpile 3. Of these metals, barium (1,600 vs. 250 mg/kg) and lead (34 vs. 12 mg/kg) were detected at higher levels in the surface soil samples obtained from the September 2012 Fenceline Borings and Perimeter Borings (first values in brackets) compared to the 2007 HHRA EPCs (second values in brackets). Copper and zinc were further detected at maximum concentrations of 17 and 190 mg/kg, respectively, in the 2012 surface soil samples, which exceed the respective background MDCs of 11 and 44 mg/kg. Cadmium was detected in four 2012 surface soil samples at a MDC of 0.78 mg/kg, less than the residential CHHSL of 1.7 mg/kg. Strontium was detected in all but one of the 2012 surface soil samples with an MDC of 100 mg/kg.

The 2007 HHRA calculated a current non-cancer hazard estimate of 0.02 for the offsite resident/trespasser receptor exposed to surface soil at Stockpile 3. Shaw considered one of the COPCs for Stockpile 3 to be a carcinogen, and therefore they calculated no cancer risk. Based on the 2012 metal concentrations being the same order of magnitude as those used in the 2007 HHRA, the lack of any 2012 metal detections exceeding respective residential CHHSLs or RSLs, and the estimated non-cancer HI being orders of magnitude less than the threshold of 1, the 2007 HHRA risk and hazard calculations for the current resident/trespasser remain valid for Stockpile 3.

3.2.4 Stockpiles 1 through 3 - Future Construction Worker and Offsite Resident

The MDCs for ten metals (arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium and zinc) reported for 165 soil samples from the 2006 SI as the COPCs for Stockpiles 1 through 3 and the PAH benzo(a)pyrene as a COPC were used in the 2007 HHRA. The metals barium (130,000 vs. 72,000 mg/kg), copper (41 vs. 29 mg/kg), and zinc (200 vs. 110 mg/kg) were detected at higher concentrations in the soil samples obtained from the September 2012 Fenceline Borings and Cadmium Borings (first values in brackets) as compared to the 2007 HHRA EPCs (second values in brackets). The calculated 95th percentile UCL for the 2012 barium data is 7,556 mg/kg, significantly less than the MDC of 130,000 mg/kg and the EPC of 72,000 mg/kg used in the 2007 HHRA. Strontium was detected in all but one of the 2012 soil samples with an MDC of 270 mg/kg.

The 2007 HHRA calculated current cancer risk and non-cancer hazard estimates of 9.2E-7 and 0.4, respectively, for the construction worker receptor exposed to soil at Stockpiles 1 through 3. The calculated current cancer risk and non-cancer HI were 6E-10 and 0.017, respectively, for the future offsite resident receptor exposed to soil at Stockpiles 1 through 3. Based on the conservative approach of using MDCs of each metal versus the 95th percentile UCLs, the 2007 HHRA risk and hazard calculations for future conditions for construction workers and offsite residents remain valid for Stockpiles 1 through 3. The 2007 HHRA calculated excess cancer risks is order(s) of magnitude less than the conservative criterion of 1E-6, and the estimated non-cancer HI is significantly less than the threshold of 1.

3.2.5 Onsite Shallow Groundwater

The MDCs for twelve metals (barium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, vanadium and zinc) reported for groundwater samples collected in June and October 2006 were identified as the COPCs for evaluation of the hypothetical shallow groundwater user. The maximum 2006 metal concentrations were reported for samples obtained from wells MW-5 and MW-6. Of these metals, cobalt (5.3 vs. 3.0 µg/l), copper (7.4 vs. 6.2 µg/l), manganese (290 vs. 260 µg/l), nickel (9.6 vs. 7.1 µg/l), selenium (4.4 vs. 3.0 µg/l), vanadium (42 vs. 34 µg/l) and zinc (120 vs. 15 µg/l) were detected at slightly higher concentrations in the 2012 groundwater samples (primarily from upgradient well MW-10) compared to the 2007 HHRA EPCs. Strontium was detected in all of the 2012 groundwater samples with an MDC of 1,400 µg/l.

The 2007 HHRA calculated a current non-cancer HI for the hypothetical shallow groundwater user at 0.9. None of the selected groundwater COPCs are considered to be carcinogens and therefore the 2007 HHRA did not calculate a cancer risk. Based on the similar metals data with the majority of the higher concentrations reported for samples collected from upgradient well MW-10, and the estimated non-cancer HI being less than the threshold of 1, the 2007 HHRA risk and hazard calculations for the hypothetical groundwater user remain valid.

3.2.6 HHRA Update Summary

The 2007 HHRA conservatively utilized MDC or 95% UCL soil and groundwater COPC concentrations obtained during the Shaw 2006 SI and groundwater monitoring events. The comparison of these EPCs to the 2012 soil and groundwater data collected at the Site indicates that the 2012 soil and groundwater data is similar to the 2006 data utilized in the 2007 HHRA and do not significantly increase the conservative cancer risk and non-cancer HIs. The 2007 HHRA remains valid with respect to exposure potential for the current resident/trespasser, future construction worker and offsite resident, and hypothetical shallow groundwater user at the Caltrans Modesto Soil Stockpile Site.

The DTSC commented on the HHRA update in a letter dated February 15, 2013, which included a memorandum from the Human and Ecological Risk Office (HERO) dated February 14, 2013. The HERO memorandum stated: "*the soil stockpiles do not pose a cancer risk or noncancer hazard to persons in the vicinity of these stockpiles as long as the stockpiles remain in place and are properly managed. The evaluation presented here is based on concentrations measured in surface soil. There are areas in the stockpiles with elevated concentrations of chemicals at depths greater than one foot below ground surface. Therefore, if there is substantial grading or reworking of the stockpiles or if the stockpiles are* *removed, these elevated concentrations at depth will have to be evaluated with respect to the potential for exposure by residents living adjacent or near the stockpiles during the period when the soil is being moved."* Being "properly managed" implies that Caltrans would continue the current management which includes: maintaining fencing and signage around the stockpiles thereby limiting access to the stockpiles, not disturbing or exposing soil in the stockpiles, maintaining vegetative cover to reduce potential wind and rain soil erosion and transport offsite (i.e. soil dust transport from wind and sediment laden surface water runoff), mowing the vegetative cover to minimize fire danger, and groundwater and stormwater runoff monitoring.

In a letter dated April 4, 2013, DTSC stated their concurrence with the findings of the HHRA Update as follows: *"DTSC concurs with reports titled "SSI, Caltrans Modesto Soil Stockpiles, State Route 132 West Freeway/Expressway Project, Stanislaus County, California" (Geocon, March 1, 2013) and "HHRA Update, Caltrans Modesto Soil Stockpiles, State Route 132 West Freeway/Expressway Project, Stanislaus County, California."*

3.3 Remedial Action Objective

RAOs are medium or site-specific goals for protecting human health and the environment. RAOs are developed as a basis for evaluating the ability of remedial alternatives to comply with ARARs and to protect human health and the environment.

As summarized in Sections 3.1 and 3.2, the 2007 HHRA found that potential exposure to COPCs in surface soil of the stockpiles under the current land use and proposed future land use scenarios does not pose an unacceptable risk or hazard. Additionally, the hazard for a hypothetical future groundwater user is less than the threshold of concern. The update to the 2007 HHRA supported these findings and conclusions and the DTSC concurred with the HHRA update under the condition that the stockpiles be properly managed and potential receptors not be exposed to COPCs in deeper soil within the stockpiles. The potential for the stockpiles to impact groundwater from a water quality degradation standpoint remains a concern of the CVRWQCB.

Therefore, the RAOs for the Site are to protect the health of neighboring residents, onsite trespassers, and Caltrans-authorized personnel and prevent future impact to groundwater by managing the stockpiles either in-place or by removing them from the Site. General response actions (GRA) to accomplish the RAOs are discussed in Section 4.0.

3.4 ARARs

ARARs are used to determine the extent of site cleanup and govern the implementation and operation of the selected action. ARARs are necessary to establish RAOs in order to support subsequent remediation alternatives screening. ARARs consist of three categories.

- Chemical-specific ARARs are either health or environmentally based numerical values or methodologies limiting the amount of a contaminant that may be released to or allowed to remain in the environment during and upon successful completion of a remedial action, including establishing cleanup levels for soil or groundwater at an affected site. Examples include drinking water MCLs and waste classification thresholds.
- Action-specific ARARs are remedial, technology, or activity based requirements or limitations on specific remedial actions at a site. Examples include prohibitions or restrictions for the discharge of chemicals or contaminants to the air, water, or soil and the proper transfer, treatment, or storage of chemicals and contaminants.
- Location-specific ARARs are restrictions or prohibitions placed on remedial actions at a given location due to features, such as a flood plain, wetland, sensitive ecosystem, seismic, or historic area. Examples include the National Historic Preservation Act and Endangered Species Act.

Additionally, "To Be Considered" (TBC) standards are non-promulgated advisories or guidance issued by Federal or State agencies that complement ARARs. Both the USEPA and DTSC have guidance materials. For example: USEPA has guidance on assessing risk and identifying preliminary remediation goals including *the Human Health Evaluation Manual* (Parts A & B) *Risk Assessment Guidance for Superfund* and Regional Screening Levels, and the California Environmental Protection Agency/DTSC has *Supplemental Guidance for Human Health Risk Assessment* and California Human Health Screening Levels.

3.4.1 Summary of State and Federal ARARs

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically apply to cleanup at a site. The process for determining applicable standards is set forth in Section 121(d) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In part, CERCLA states that the more stringent of State or Federal requirements will apply to cleanup sites. Typically, California requirements are more stringent than Federal requirements.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not applicable, address problems or circumstances similar to those found where the proposed removal action will be performed, and are well suited to the conditions of the cleanup site. Requirements that are determined to not be legally applicable are evaluated to determine whether they are relevant and appropriate. A requirement must be both relevant and appropriate to be an ARAR. Criteria for determining relevance and appropriateness are listed in Part 40, Code of Federal Regulations (CFR) Section 300.400(g)(2).

According to CERCLA ARAR guidance, requirements may be “applicable” or “relevant and appropriate,” but not both. ARARs are identified on a site-specific basis, using a two-part analysis to determine first if a requirement is applicable, and then, if not applicable, whether it is both relevant and appropriate. Based on CERCLA ARAR guidance, an ARAR qualifies as a State ARAR if it meets the following requirements:

- It is a State law;
- It is an environmental, or facility siting law;
- It is promulgated, and thus generally applicable and legally enforceable;
- It is substantive rather than procedural or administrative;
- It is more stringent than the Federal requirement;
- It is identified in a timely manner; and
- It is consistently applied.

3.4.2 ARARs for Remediation of the Stockpiles

Table 1 is a compilation of ARARs for remediation of the stockpiles.

3.5 Cleanup Goals

Cleanup goals are numerical or performance-based goals to which a cleanup (remedial) action can be compared to determine when the action has been performed to an extent that it can be considered complete. Numerical-based goals are quantitative limits (units of concentrations, volumes, etc.) that a cleanup action must meet in order to be considered complete. An example of a numerical-based goal is a COPC concentration in affected media (e.g., soil, soil vapor, groundwater, surface water, air) that has been determined to represent an acceptable health risk or other regulatory level and which cleanup must achieve in order to be considered complete. A performance-based goal is an action such as removal, capping, or treatment which a cleanup action must achieve in order to be considered complete. An example of a performance-based goal would be the placement of a one-foot-thick layer of clean soil over an area of contaminated soil to minimize potential exposure to COPCs in the soil.

The HHRA demonstrated that the excess cancer risk related to exposure to COPCs in surface soil of the stockpiles is orders of magnitude less than the conservative criterion of 1E-6, and the non-cancer HI is orders of magnitude less than the threshold of 1. The DTSC concurred with the findings of the HHRA and HHRA update under the condition that the stockpiles continue to be properly managed and not graded or reworked to expose COPCs in deeper soil within the stockpiles.

Based on the current level of health risk and stockpile management practices, it is not necessary to achieve a numerical-based cleanup goal to be protective of human health. Therefore, the cleanup goal for the project will be performance-based to assure that there is no route of exposure to COPCs in the stockpiles and to reduce the potential threat to groundwater. The GRAs which could be implemented to manage the stockpiles are discussed in Section 4.0. The remedial action that was selected by the FS will be implemented with DTSC and CVRWQCB oversight, and these agencies will provide a final determination as to when the action is complete.

4.0 SUMMARY OF FEASIBILITY STUDY

This section summarizes the FS which was performed to evaluate potentially applicable remedial actions ("alternatives") for the stockpiles. The FS process selected the most appropriate alternative through an evaluation of alternatives against nine qualifying criteria. A draft FS was submitted to the DTSC and CVRWQCB for their review and comment. The FS was approved by the DTSC and CVRWQCB on June 30, 2014.

4.1 Identification and Screening of Technologies

In accordance with the USEPA's CERCLA *Guidance for Conducting Remedial Investigations and Feasibility Studies* (USEPA, 1988) the FS first considered GRAs that could be implemented to address the stockpiles. GRAs are general remedial action categories such as institutional controls, removal, containment, treatment, and reuse/recycling/reclaim. Under CERCLA, evaluation of a "no action" alternative is also required for comparison purposes. The FS then evaluated remedial technologies that could be implemented for each GRA and lastly, process options for each technology. "Process option" is a CERCLA term used for technologies that are being pre-screened. The potential for a process option to treat the stockpiles and to achieve the RAO was evaluated, as were the potential impacts on human health and the environment during implementation of the process option.

The FS then screened potentially applicable remedial technology process options against the criteria of effectiveness, implementability, and cost. The following table lists the GRAs, remedial technologies, and process options that were evaluated in the FS.

Evaluation of General Response Actions and Process Options for the Caltrans Modesto Soil Stockpiles

Soil Specific General Response Actions	Remedial Technology	Process Option	Effectiveness	Implementability	Cost	Screening Comments
No Action	None	Not applicable	Does not meet RAO and does not reduce toxicity, mobility, or volume of contaminants.	Readily implementable as no actions are required.	negligible to very low	Retained as required by NCP
Institutional Controls	Governmental and Administrative Controls	Deed restrictions and covenants	Contaminant mass unchanged. Establishes land use restrictions and limitations protective of human health.	Readily implementable with most of the activities being performed by DTSC.	Low capital and O&M costs	Potentially applicable (deed restriction and covenants) in combination with other response actions. Retained.
	Access Restrictions	Physical barrier and access control	Contaminant mass unchanged. Prevents unauthorized access to protect human health.	Readily implementable as fencing is currently maintained around the Site.	Low capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Informational	Signage, public notices	Contaminant mass unchanged. Signage and notices raise public awareness.	Readily implementable at the Site and will be maintained	Low capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Monitoring	Air monitoring	Contaminant mass unchanged. Monitors airborne COC's.	Implementable	Low to moderate capital and O&M costs	Air is not a medium of concern for the final remedy, but is a short-term concern during construction so retained for consideration with other options.
		Site monitoring	Contaminant mass unchanged. Documents physical conditions of Site.	Readily implementable as this is currently ongoing at the Site.	Low to moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
		Groundwater monitoring	Contaminant mass unchanged. Documents groundwater conditions/quality surrounding Site.	Readily implementable as this is currently ongoing at the Site.	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
Removal	Excavation, loading, transport, disposal	Off-site landfill	Physical removal of contaminant mass. Nullifies mobility.	Implementable	Prohibitively high capital costs; negligible O&M costs	Potentially applicable. Retained.
Containment	Runoff/infiltration controls	Grading	Contaminant mass unchanged. Directs, collects, and transmits runoff away from Site. Decreases infiltration and contaminant mobility.	Readily implementable	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
		Revegetation	Contaminant mass unchanged. Decreases erosion. Decreases soil moisture content via increased evapo-transpiration. Decreases contaminant mobility.	Readily implementable	Moderate capital and O&M costs	Potentially applicable in combination with other response actions. Retained.
	Capping	Encapsulation beneath highway structures	Contaminant mass unchanged. Contains and isolates contaminants. Effectively eliminates contaminant mobility.	Readily implementable	Moderate to high capital and moderate O&M costs	Potentially applicable. Retained.
		Encapsulation beneath a vegetated clean soil layer	Contaminant mass unchanged. Contains and isolates contaminants. Effectively eliminates contaminant mobility.	Readily implementable	Moderate to high capital and moderate O&M costs	Potentially applicable. Retained.
Treatment	Chemical Treatment	Soil Washing	Potentially effective in reducing mobility and volume of contaminants. Treatment of liquid waste stream would be required.	Difficult to implement due to volume and location near residences	High capital costs for the volume of soil	Not retained after initial screening
		Soil Mixing	Potentially effective in reducing contaminant mobility; would increase volume of waste.	Difficult to implement due to volume and location near residences	High capital costs for the volume of soil	Not retained after initial screening
Reuse, Recycle, and /or Reclaim	Reuse at offsite location	Off-site non-landfill placement as fill	Would be effective in reducing mobility of contaminants for the Site, but would just transfer issues and concerns to another property.	Not implementable due to hazardous waste levels in soil.	Not applicable	Not retained after initial screening

Notes:

Shaded Cells = Shaded cells represent process technology options that were not retained after initial screening.

NCP = National Oil and Hazardous Substance Pollution Contingency Plan

O&M = Operations and Maintenance

RAO = remedial action objective

The criteria for screening the applicable technologies and process options are as follows:

- Effectiveness - the degree to which an alternative reduces the toxicity, mobility, or volume of COPCs; complies with ARARs; minimizes short-term impacts and residual risks, and provides long-term, overall protection of human health and the environment; and how quickly the alternative accomplishes these benefits.
- Implementability - the technical feasibility and availability of the technologies and the administrative feasibility of implementing an alternative.
- Cost - the cost of construction, operation, and maintenance of an alternative.

Response actions, technologies, and process options that did not satisfy the RAO and/or were not consistent with the three evaluation criteria were not retained for further consideration and analysis. Through the screening process the following alternatives were retained for further evaluation:

- Alternative 1 - no action,
- Alternative 2 - institutional controls,
- Alternative 3 - removal, and
- Alternative 4 - containment.

The treatment and reuse/recycle/reclaim alternatives were not retained for further evaluation because of difficulties with implementability (i.e., amount of soil that would require treatment, space considerations, noise, effectiveness, etc.) and cost. Elimination of the treatment and reuse/recycle/reclaim options is supported by the DTSC's *Proven Technologies and Remedies (PTR) Guidance, Remediation of Metals in Soil* (DTSC, 2008), which eliminates these and other technologies from further evaluation based on DTSC's extensive experience on projects where metals are the primary COPC. The DTSC reviewed technologies that have been implemented for remediation of metals in soils at 188 sites and found that, while technologies such as stabilization, vitrification, metallurgical separation, soil flushing, soil washing, and other treatment processes have been implemented, "containment by capping" and "excavation and offsite disposal" were by far the most frequently implemented cleanup alternatives. The Site also has the necessary characteristics that make it favorable for a streamlined screening of technologies including:

- primarily metals contamination - the primary COPC is barium,
- no emergency actions required,
- contamination less than 15 feet deep - the stockpile soil and associated COPCs are all above natural grade,
- low potential for surface water impact,
- metals in immobile form - barium is in the form of barite which has a low solubility,
- low potential for groundwater impact - COPC concentrations in groundwater are less than water quality goals (MCLs), and
- no ecological habitat or sensitive receptors impacted.

We retained institutional controls for further evaluation because the stockpiles are essentially being managed under institutional controls now and if the SR-132 Project were not built, continued management of the stockpiles through institutional controls is an alternative to be considered for the stockpiles.

4.2 Identification of Alternatives for Soil

Each of the alternatives that were retained for further evaluation is summarized in the following subsections.

4.2.1 Alternative 1 - No Action

Under this alternative the stockpiles would remain in place and not be disturbed. There would be no excavation, alteration, or removal of soil from the stockpiles. In essence, the SR-132 Project would not be constructed and the stockpiles not utilized as embankment fill as intended. Additionally, under the no action alternative, site control, maintenance, and monitoring activities would be discontinued.

However, as long as Caltrans continues to own and control the Site as State ROW, they would continue to maintain the perimeter fence and continue restricting access to Caltrans-authorized personnel. Therefore, the most likely site occupant would be a trespasser. The 2007 HHRA and recent update to the HHRA concluded that the concentrations of COPCs in the stockpiles do not pose an unacceptable level of health risk to an onsite trespasser. Therefore, no action could be considered protective of human health as long as land use remains the same and access is restricted.

No Action Alternative Summary

No action would be the least effective alternative as it would not reduce the contaminant mass or the potential of the COPCs to impact surface water or groundwater quality. This alternative would not meet the RAO and therefore would not be acceptable to the regulatory agencies and likely not be acceptable to the community either. It is implementable because no activities would be performed and there is no cost associated with this alternative.

4.2.2 Alternative 2 - Institutional Controls

Technologies considered for the stockpiles under institutional controls included:

- governmental and administrative controls;
- site-access restrictions;
- informational and/or communication devices; and
- monitoring.

Although no reduction in the toxicity or volume of COPCs would result from the implementation of institutional controls as the remedial alternative for the stockpiles, implementation in conjunction with other remedial actions could achieve the RAO. As described in Section 3.3, the RAO for the stockpiles is to further protect human health by minimizing or eliminating receptor exposure routes and significantly reduce potential impacts to soil, surface water, or groundwater by isolating and encapsulating the stockpile soil as structural fill within the SR-132 Project.

Governmental and Administrative Controls

Governmental and administrative controls use the regulatory authority of a government entity to impose restrictions under its jurisdiction, custody, or control. The process option considered for governmental and administrative controls is deed restrictions and covenants that limit land uses to those that have less potential for exposure based on the nature of the development and the types of site occupants/users associated with the acceptable land uses. Governmental and administrative controls may be used in conjunction with other remedial technologies. This process option may provide some limitations on the present and future land use; however, the stockpiles would remain at the Site in their current condition. No technical issues exist that would adversely affect the feasibility of implementing this process option. The cost to implement and ongoing operations and maintenance (O&M) costs are considered to be negligible-to-low.

Site Access Restrictions

This technology consists of one process option: maintaining the existing physical barrier to site access (fencing) with controlled access to Caltrans-authorized personnel only. This option will minimize human receptor contact with COPCs in the soil.

Fencing and access control can be effective in mitigating exposure to COPCs, but does not reduce toxicity or volume. Ongoing O&M would be required to ensure continuing effectiveness. There are no technical issues that would adversely affect the feasibility of implementing this process option. However, site-access restrictions may not effectively deter all trespassers. This process option may not receive community acceptance. Capital and O&M costs associated with this process option are considered low.

Informational and Communication Devices

Informational and communication devices include posting advisories (signage) at the Site, deed notices, public awareness meetings, and fact sheets to inform the public about potential risks at the Site. It is difficult to ensure that informational and/or communication devices will be effective in reducing exposure to COPCs in the stockpiles as not all members of the community may receive the information and, as may be the case with access restrictions, communication of risks still may not deter trespassing.

Monitoring

The various process options for the monitoring technology include monitoring of air, groundwater, stormwater, and site conditions. Each of these process options is described below.

Air Monitoring - Monitoring of COPCs in ambient air could be performed in combination with other institutional controls as well as other technologies such as removal and containment. The stockpiles are vegetated with seasonal grasses and, as a result, airborne dust has not been an issue to date. Therefore, air monitoring in combination with other types of institutional controls would not provide further protection of human health. Air monitoring would be performed in combination with remedial technologies that involve disturbing soil in the stockpiles such as excavation for removal or grading for containment to ensure that dust control measures are being effectively implemented and confirm a negative, short-term exposure for workers and nearby residents. Air monitoring when implemented in this manner would be an effective process option.

Groundwater Monitoring - Groundwater monitoring currently consists of biannual groundwater elevation measurements and annual groundwater sample collection from ten wells, laboratory analysis of samples, and reporting. As with air monitoring, groundwater monitoring could be performed in combination with other institutional controls as well as other technologies such as removal and containment. If institutional controls were implemented, the long-term effect of the stockpiles on groundwater quality would likely need to continue to be monitored. Similarly, if containment was implemented, groundwater monitoring would likely be required for some period to assess the effects of containment on groundwater quality. Groundwater monitoring would likely not be required following removal of the stockpiles.

Stormwater Monitoring - Stormwater monitoring has been conducted and would continue as long as the stockpiles or portions of them are exposed to precipitation.

Site Conditions Monitoring - Monitoring of site conditions has been ongoing and would continue in combination with other institutional controls or the containment GRA. Site conditions monitoring currently consists of fence inspection, repair, and maintenance, and mowing of the grass cover on the stockpiles to reduce fire danger and would continue as such under the institutional controls GRA. Site conditions monitoring would also be continued with the containment GRA during the interim progress phase where not all of the stockpiles are isolated and encapsulated beneath roadways and behind retaining walls, but are temporarily covered with a vegetated, clean soil layer.

Institutional Controls Alternative Summary

The DTSC has indicated that the stockpiles in their current condition do not pose an unacceptable risk to human health based on continued management of the stockpiles. Management consists of: limiting access to only Caltrans-authorized personnel, regularly inspecting and maintaining the chain-link fence, prohibiting any activities involving excavation/grading, offsite removal of soil, or placement of other soil on the Site, and maintaining the current vegetative cover. DTSC also stated that Caltrans should continue to maintain the groundwater monitoring program for the Site. These management activities and site conditions constitute institutional controls and they would be effective in meeting the RAO.

This alternative provides a higher level of protection to human health and the environment than no action and has regulatory acceptance by the DTSC. Although the DTSC has stated that the stockpiles do not pose a risk to human health for Caltrans workers, trespassers, or offsite residents under the current controlled and monitored conditions, the CVRWQCB has indicated that the stockpiles would need to be maintained in order to protect groundwater quality if the SR-132 Project were not constructed. Due to the perception by the public of some degree of health risk or threat to the environment, a more proactive remedial action is likely preferred by the community. This alternative is the second lowest in cost and the second most implementable.

4.2.3 Alternative 3 - Removal

This alternative consists of complete removal of the stockpiles from the project area and disposal of the soil in an approved, offsite waste disposal facility or facilities. This alternative would require that soil confirmation sampling and analysis be conducted in an effort to confirm that the stockpiled soil had been adequately removed. Implementation of this alternative would necessitate that a volume of clean fill material similar to that removed be imported to the project area for construction of the SR-132/SR-99 interchange embankments. Under this alternative, groundwater monitoring would likely be discontinued; however, the timing of the cessation of groundwater monitoring would be determined in concert with the DTSC and CVRWQCB.

Removal of the stockpiles would reduce COPC mobility, toxicity, and volume for the Site, thereby eliminating routes of exposure for any future land use on the Site. Engineering controls and air monitoring would be used to limit exposure to onsite workers during excavation and loading of soil. During excavation, air would be monitored to confirm that dust suppression methods (water spray) are effective in preventing airborne dust so that workers and offsite residents would not be exposed to COPCs or dust particulates.

There are no significant barriers to implementing this process option administratively. However, this option would require that the removed soil be replaced by importing an even larger volume of clean fill soil in order to construct the SR-132 Project.

Removal Alternative Summary

Removal of the stockpiles and disposal in an offsite landfill would provide the greatest degree of protection of human health and the environment and may be the most acceptable to the DTSC, CVRWQCB, and the community. Short-term impacts would be the greatest with this alternative due to potential air quality and traffic impacts. Air emissions from soil removal equipment (e.g., graders, excavators, loaders) and trucking will be greatest with this alternative. This alternative would also have the highest cost of the four. This alternative could be performed in compliance with State and Federal requirements. Although technically implementable, removal is the least implementable of the four alternatives because the stockpiles would have to be replaced with an even greater amount of clean soil fill in order to build the project. This would pose an impact to funding and delay in the construction of the project.

4.2.4 Alternative 4 - Containment

This alternative consists of isolation and encapsulation (containment) of the stockpiled soil within the SR-132/SR-99 interchange portion of the SR-132 Project by using the stockpiles for embankment fill as originally planned. The interchange project will be constructed in phases such that the interim progress phase, scheduled to be completed in 2018, will cover the approximate southern half of Stockpiles 1 and 2 and reconfigure, consolidate, and cover all of the soil from Stockpile 3. The ultimate build-out phase of the project, to be completed by 2028, will cover the remaining approximate northern half of Stockpiles 1 and 2. Following completion of the interim progress phase and prior to completion of the ultimate build-out phase, the portion of the stockpiles not covered/contained by retaining walls, bridge abutments, slope pavements, and roadway pavement would be maintained as they currently are. Under this alternative groundwater monitoring would likely be continued for a period of time to be determined in concert with the DTSC and CVRWQCB.

If the planned SR-132 Project were not constructed, an alternative form of cap could be installed over the stockpiles. The alternative cap could consist of constructing a layer of clean soil (typically one foot thick) over the stockpiles. Prior to constructing the cap, the surface of the stockpiles would be graded for drainage to ensure primarily that stormwater did not pond on top of the stockpiles. Following construction, the cap surface would be vegetated to protect against stormwater and wind erosion.

Containment Alternative Summary

Containment of the soil by isolation and encapsulation within the SR-132/SR-99 interchange portion of the SR-132 Project (or under an alternative cap if the SR-132 Project was not constructed) will provide the second highest level of protection of human health and the environment of the four alternatives. It will eliminate routes of exposure to COPCs in the soil and minimize the potential for stormwater infiltration. Short-term exposure to COPCs by construction personnel and adjacent residents can be minimized through the implementation of dust controls (e.g., water spray of disturbed areas). Long-term protection of human health and the environment would be provided by isolation and encapsulation of the soil within the project. This alternative can be performed in compliance with State and Federal requirements. This alternative would be implemented with DTSC oversight; therefore, regulatory acceptance is anticipated. This alternative should also be acceptable to the community as it is protective of human health and the environment. It is the third most costly of the alternatives, but significantly less than removal. It is the third most implementable of the alternatives, but its implementability is considered to be good as the stockpiles would be used for their originally intended purpose.

4.3 Evaluation of Alternatives

In accordance with CERCLA guidance and the remedial technology screening, four alternatives were retained for further evaluation in the FS:

- Alternative 1 - No action;
- Alternative 2 - Institutional controls;
- Alternative 3 - Removal (excavation and offsite disposal); and
- Alternative 4 - Containment.

Each of these alternatives is described in the following subsections then evaluated against the nine National Contingency Plan (NCP) criteria.

4.3.1 Evaluation Criteria

The nine NCP evaluation criteria used in the FS are as follows:

Threshold Criteria:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs

Balancing Criteria:

3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, and Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost

Modifying Criteria:

8. Regulatory Acceptance
9. Community Acceptance

Each evaluation criterion is described below. Remedial alternatives for the stockpiles were compared to the first seven of the nine criteria listed. Regulatory and community acceptance were evaluated after the draft FS was finalized and the preferred alternative approved by the DTSC and CVRWQCB. The RAO is stated in Section 3.3, which is to build the SR-132 Project using the stockpiles as embankment fill as originally intended, which in turn will provide a greater degree of protection of human health and the environment than currently exists. Therefore each alternative's attainment of the RAO is presented in the evaluation of Overall Protection of Human Health and the Environment.

Threshold Criteria

Threshold criteria relate to statutory requirements that each alternative must satisfy in order to be eligible for selection.

Overall Protection of Human Health and the Environment. This criterion was used to assess each alternative's ability to protect human health and the environment. The assessment of overall protection describes how risks to human health and the environment are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. While the HHRA and update to the HHRA found that potential exposure of onsite trespassers and offsite residents to COPCs under the current land use and of construction workers and adjacent residents during construction of the SR-132 Project does not pose an unacceptable risk or hazard, the detailed evaluation still considered potential further reductions in risks to human health and the environment afforded by each alternative.

Compliance with ARARs. This evaluation criterion was used to determine whether each alternative would meet the Federal and State ARARs identified in Section 3. The ability of a remedial alternative to comply with certain ARARs that were identified for the remedial action would depend entirely on the manner in which the remedy is implemented. For evaluation purposes, it was assumed that any remedy selected would be implemented in a manner that would meet these ARARs.

Balancing Criteria

Balancing criteria were used to evaluate the technical aspects of a remedial alternative and include the following:

Long-Term Effectiveness and Permanence. This criterion was used to assess the long-term ability of the remedial alternative to address the threshold criteria by (1) assessing the risk remaining at the site after implementation of the remedial alternative, and (2) evaluating the long-term adequacy and reliability of the remedial alternative, including requirements for management and monitoring.

Reductions in Toxicity, Mobility, and Volume of COPCs. This criterion is used to assess a remedial alternative's ability to reduce the inherent risk of the waste material. Technologies that permanently and significantly reduce toxicity, mobility, or volume are preferred over alternatives that only manage the stockpiles left in place. However, the degree of toxicity, mobility, or volume reduction achieved for the cost to achieve it is heavily weighted. Therefore, technologies that may have a significant effect on one or more of the criteria, but not necessarily all three, are strongly considered. As an example, a major factor to be considered is that the stockpiles were originally placed for construction of the SR-132 Project, which is now nearing implementation. If the stockpiles were to be removed from the Site in an attempt to achieve the greatest possible reduction in toxicity, mobility, and volume of COPCs, the soil would have to be replaced by other clean fill at considerable expense to complete the project. The expense incurred for removal and replacement is not warranted for the degree of protection achieved.

Short-Term Effectiveness. This criterion is used to assess the risks posed to the community, workers, and the environment during the implementation of a remedial action. Measures that would be taken to mitigate these risks will be addressed under this criterion. This criterion also considers the time required to achieve RAO.

Implementability. This criterion is used to assess the technical feasibility (constructability, reliability of technology, operation, and monitoring requirements), administrative feasibility (coordination with other agencies), and availability of services and materials (labor, equipment, and materials) to implement an alternative.

Cost. This criterion is used to assess the anticipated capital and annual O&M and monitoring costs associated with each alternative over a 30-year period. Capital and annual costs in the FS are presented in 2013 dollars. Cost estimates are provided in Tables 2 through 6.

Modifying Criteria

The modifying criteria, regulatory and community acceptance, are as follows:

Regulatory Acceptance. This assessment evaluates the technical and administrative issues and concerns the DTSC and CVRWQCB may have regarding each of the alternatives.

Community Acceptance. This assessment evaluates the issues and concerns the public may have regarding each of the alternatives. These criteria will be addressed after the public comment period for the Final RAP and therefore were not evaluated in the FS.

4.3.2 Evaluation of Alternatives

The four remedial alternatives for the stockpiles were evaluated in the FS with respect to their ability to meet the nine NCP criteria. The detailed evaluation from the FS is in Appendix A.

4.4 Comparative Analysis

The FS included a comparative analysis of the four alternatives which formed the basis for selection of the preferred alternative.

4.4.1 Alternative 1 - No Action

This alternative would provide the lowest level of overall protection of human health and the environment of the four alternatives. The level of protection for the onsite trespasser and offsite resident would remain the same as the current controlled condition, but the health risk for other land uses and receptors would need to be further evaluated. This alternative would have the lowest level of regulatory acceptance because of the lack of site controls and monitoring and maintenance. It also would likely have the lowest level of community acceptance due to the perceived threat to human health and the environment. This is the least costly of the alternatives and is the most implementable.

4.4.2 Alternative 2 - Institutional Controls

This alternative provides a higher level of protection to human health and the environment than no action and has regulatory acceptance by the DTSC. Although the DTSC has stated that the stockpiles do not pose a risk to human health for Caltrans workers, trespassers, or offsite residents under the current controlled and monitored conditions, the CVRWQCB has indicated that the stockpiles would need to be maintained in order to protect groundwater quality if the SR-132 Project were not constructed. Due to the perception by the public of some degree of health risk or threat to the environment, a more proactive remedial action is likely preferred by the community. This alternative is the second lowest in cost and the second most implementable.

4.4.3 Alternative 3 - Removal

Removal of the stockpiles and disposal in an offsite landfill would provide the greatest degree of protection of human health and the environment and may be the most acceptable to the agencies and the community. Short-term impacts would be the greatest with this alternative due to potential air quality and traffic impacts. Air emissions from soil removal equipment (e.g., graders, excavators, loaders) and trucking will be greatest with this alternative. This alternative would also have the highest cost of the four, and no funding is available for removal. This alternative can be performed in compliance with State and Federal requirements. Although technically implementable, it is the least implementable of the four because with construction of the SR-132 Project and removal of the stockpiles, which were placed specifically for the project, they would have to be replaced with an even greater amount of clean soil fill in order to build the project. This would pose an impact to funding and delay in the construction of the project.

4.4.4 Alternative 4 - Containment

Containment of the soil by either form of cap (the planned SR-132 Project or an alternative |one-foot-thick, clean soil cap with vegetative cover) will provide the second highest level of protection of human health and the environment of the four alternatives. Capping will eliminate routes of exposure to COPCs in the soil and minimize the potential for storm water infiltration. Short-term exposure to construction personnel and adjacent residents could be minimized through the implementation of dust controls (e.g., water spray of disturbed areas). Long-term protection of human health and the environment would be provided by containment of the soil beneath either type of cap. This alternative can be performed in compliance with State and Federal requirements. This alternative would be implemented with DTSC and CVRWQCB oversight; therefore, regulatory acceptance is anticipated. This alternative should also be acceptable to the community as it is protective of human health and the environment. It is the third most costly of the alternatives, but significantly less than removal. It is the third most implementable of the alternatives, but its implementability is considered to be good as the stockpiles would be used for their originally intended purpose.

4.5 Description of Recommended Alternative

Based on the screening of alternatives and comparative analysis performed in the FS, **Alternative 4 - Containment** is the recommended alternative. Containment of the stockpiles will be achieved by their use in construction of the SR-132/SR-99 interchange portion of the SR-132 Project, which requires a significant amount of fill for the embankments and is the reason the stockpiles were placed on the Site in the early 1960s. Figures 5a and 5b show the current footprint of the stockpiles overlain by design drawings of the SR-132 Project. Figure 5a shows that Stockpiles 1 and 2 are situated such that, with minor consolidation of soil along the northern and southern edges of the stockpiles, they will be covered by the SR-132 roadways and contained behind retaining walls and bridge abutments. Figure 5b shows that Stockpile 3, in its current configuration, will have to be partially relocated/consolidated to be capped by and contained within project roadways.

The stockpiled soil will be contained behind retaining walls and bridge abutments and beneath roadway pavements of the project. As described in Section 1, the project will be constructed in two phases - the interim progress phase to be completed by 2018 and the ultimate build-out to be completed by 2028. The interim progress phase of the project will consist of a two-lane roadway, which will be constructed over the southern portions of Stockpiles 1 and 2. During this phase, the northern portions of Stockpiles 1 and 2 will not be contained beneath roadways and behind retaining walls and bridge abutments, but will be graded for drainage and capped with a minimum 6- to 12-inch-thick vegetated, clean soil cap. Figures 6a and 6b show the interim progress phase of the project in plain view and indicate the portion of the stockpiles which will be temporarily covered by the clean soil cap until the ultimate build-out of the project is completed. Figures 7a and 7b show the ultimate project build-out in plan view and depict the complete containment of the stockpiles within the project retaining walls and beneath roadway pavements. Also shown on Figures 7a and 7b is that the median between the eastbound and westbound lanes of SR-132 will be covered by either pavement or a synthetic liner and clean soil layer.

Figures 8, 9, and 10 show cross-section views of the interim progress and ultimate build-out phases of the project for Stockpiles 1, 2, and 3, respectively. The cross-sections show:

- the sloping for drainage and clean soil cap over the northern portions of Stockpiles 1 and 2 during the interim progress phase and the complete containment of the stockpiles by the ultimate build-out;
- the pavement or liner cover over the median areas of the ultimate build-out;
- where the outer edges of the current stockpiles will be cut (in yellow) and placed on top of the stockpiles in the "stockpile fill consolidation zone."

Stockpile 3 will be treated differently than Stockpiles 1 and 2 in that it is planned to be entirely contained within the interim progress phase of the project. As much of Stockpile 3 as possible will be placed in the stockpile fill consolidation zone within the eastern abutment for the SR-132 bridge over SR-99 (Figures 6b and 10). The remainder of Stockpile 3 will then be placed in the stockpile fill consolidation zone of Stockpile 2 (Figure 9). At the request of the CVRWQCB, the costs were estimated to completely remove Stockpile 3, dispose of it offsite in an appropriate landfill, and import an equal volume of clean replacement fill.

Following release of the Final EIR/EA and appended Final RAP, the details of construction of the project will be presented in a Remedial Design Implementation Plan (RDIP).

4.6 Justification for Recommended Remedy

The preferred remedy, Alternative 4 - Containment, will contain the soil beneath roadway pavements and behind retaining walls and bridge abutments of the planned SR-132 Project or beneath a clean soil, vegetated cap to eliminate direct exposure and to be protective of groundwater and surface water. The primary factors which supported the selection of are: (1) this alternative is protective of human health and the environment and is technically feasible; (2) this alternative is cost-effective because funding is available for construction of the SR-132 Project; and (3) this alternative will help minimize the potential for contaminants to migrate to groundwater or to be eroded by stormwater runoff.

Alternative 4 for soil was rated good for the threshold criteria of overall protection of human and environment and compliance with ARARs and good for the balancing criteria long-term effectiveness, reduction of toxicity, mobility and volume, short-term effectiveness, and implementability. Furthermore, it is the most cost effective of the remedial alternatives that meets the threshold criteria requirements.

5.0 PRELIMINARY REMEDIAL DESIGN FOR SOIL REMEDY

This section describes how Alternative 4 - containment will be implemented. Further detail will be provided in the RDIP.

5.1 Permitting

Permitting for the construction project will likely consist of a grading permit with the City of Modesto, filing of an air impact assessment (AIA) with the San Joaquin Valley Air Pollution Control District (SJVAPCD), and a preparation of a Stormwater Pollution Prevention Plan (SWPPP). Prior to the start of construction, a scoping meeting will be held to discuss the stockpile grading activities, dust mitigation and monitoring, health and safety, and project scheduling. Attendees at the scoping meeting should include Caltrans personnel, representatives of the contractor and subcontractors performing the construction, project design consultants, construction inspectors, and regulatory agency representatives. The applicable permits for the project will be reviewed at the scoping meeting to confirm that they have been obtained and to review the applicable requirements of each.

5.2 Utility Clearance

Although no utilities are anticipated to be present within the project footprint where the stockpiles are, if any subsurface utilities could be affected by the construction project, they will be addressed prior to construction with those specific utility owners. Standard utility clearance precautions such as obtaining an Underground Service Alert (USA) ticket for the project will also be taken.

5.3 Site Preparation

Following pre-construction utility relocations (if any), any debris or other materials/items will be removed. If any vegetation grubbing is required (not anticipated), the Site will be moisture-conditioned to minimize dust generation. Air monitoring for dust emissions, which is described in Section 5.6, will be implemented during grubbing.

5.4 Excavation Extent and Methods

Excavation will not be performed for removal purposes, but only to reconfigure the stockpiles to meet project design criteria for fill placement. Using a combination of equipment including scrapers and excavators, soil will be excavated from the stockpile sides and pulled up onto the stockpiles into the "stockpile fill consolidation zone" (Figures 8, 9, and 10) to make way for retaining wall and bridge construction, placement behind the walls and abutments, and to meet design heights and widths.

5.5 Control Measures

Excavation and fill placement will be controlled by the grading contractor and the surveyors in accordance with the project design. Construction geotechnical inspectors will control fill compaction through observation and testing.

5.6 Perimeter Air Monitoring During Excavation

Perimeter air monitoring will be performed during site grubbing (if necessary) and the early stages of grading to assess the effectiveness of dust control measures. As part of the RDIP, an air monitoring plan showing air monitoring locations and describing equipment and sampling and analysis methods will be provided to DTSC for their review and approval. If the results of air monitoring demonstrate that dust control measures are effective and that there is no exposure to COPCs in the stockpiles via airborne dust, then the frequency of monitoring may be decreased with the approval of DTSC.

5.7 Field Variances

If field procedures for soil excavation, relocation, dust control, air monitoring or other field activities need to be modified to meet changed conditions or project improvement/efficiency relative to the planned activities, a request for a variance from DTSC will be requested. The request will describe the reason and need for the requested modification. The modification will not be implemented without prior approval from DTSC.

5.8 Confirmation Sampling and Analysis Plan

Confirmation soil sampling will be proposed for locations where stockpile soil is relocated or consolidated at the Site. A confirmation sampling and analysis plan will be included in the RDIP.

5.9 Transportation Plan

Soil is not proposed to be transported off of the Site for the project, but only moved within the project footprint. Any transportation of soil will be limited to within the Caltrans ROW and not on public thoroughfares. Therefore, a transportation plan will not be included in the RDIP.

5.10 Recordkeeping

Recordkeeping related to movement and placement of the stockpile soil will be the responsibility of the grading contractor that is handling the soil as part of construction. Construction inspection records including compaction and survey data will be maintained by the inspecting firm and surveyor with copies provided to the grading contractor.

6.0 LAND USE CONTROLS

Concentrations of some COPCs in soil samples collected from Stockpiles 2 and 3 exceeded residential screening levels. Because this soil will be left on the Site and contained by the project, a land use covenant (LUC) will be required to be recorded restricting the types of land use that are allowed on the Site. The LUC will recognize that the proposed transportation land use is compatible and is acceptable from a health risk standpoint. Other unrestricted land uses (e.g., residential, schools, daycare, hospital, senior care, etc.) will not be allowed on the Site.

The LUC will be prepared consistent with DTSC policy and finalized and recorded after physical remedial measures are implemented and before the Site is certified by the DTSC as having been remediated. The LUC will run with the land and stay in effect as long as hazardous substances limit use of the Site and until terminated by the DTSC. Pursuant to Section 67391.1 of Title 22, Division 4.5, Chapter 39, CCR, the project proponent will pay all costs including for DTSC oversight associated with administration of the LUCs. The DTSC has authority to require modification or removal of any land improvements placed in violation of the restrictions. Violation of the LUC will be grounds for the DTSC to file civil or criminal actions as provided by law.

7.0 MONITORING AND REPORTING

This section describes monitoring and reporting activities that will be conducted during and following implementation of the recommended remedial alternative.

7.1 Monitoring

Monitoring of the stockpiles, groundwater, and stormwater will continue until such time as the project is complete or the DTSC and CVRWQCB indicate that it is no longer necessary. Monitoring of the stockpiles will include monitoring of the state and effectiveness of the vegetative cover on the portions not yet contained by the project, monitoring of the fencing to ensure that access to the stockpiles continues to be restricted, and monitoring of potential erosion and transport of soil off of Caltrans ROW. Figures 5a and 5b show the proposed extent of the interim progress phase of the project relative to the current extent of the stockpiles. The portion of the stockpiles not contained (the northern portion of Stockpiles 1 and 2) will be graded for drainage and capped with a minimum 6- to 12-inch-thick vegetated, clean soil cap. These portions of the stockpiles will continue to be maintained and monitored in accordance with DTSC and CVRWQCB requirements until the ultimate build-out phase of the project is completed and the stockpile soil completely contained within the project. Groundwater monitoring for the COPCs will continue and stormwater monitoring will continue on a weather-dependent basis.

7.2 Reporting

Reporting of monitoring efforts will continue on an annual basis until no longer required by DTSC and/or the CVRWQCB.

7.3 Five-Year Review

Depending on project funding and the phased schedule for completion of the project, DTSC may perform five-year reviews to assess the effectiveness of the remedial measure between construction phases and after project completion. The five-year reviews would likely revisit mainly the maintenance of the portion of the stockpiles not yet contained within the project and condition of vegetated soil covers and liners. Monitoring of groundwater and surface water will have been ongoing and routinely reported to DTSC and the CVRWQCB and therefore would not be a focus of the reviews.

8.0 RAP PREPARATION AND IMPLEMENTATION SCHEDULE

The RAP completion dates and anticipated schedule for the SR-132 Project from submittal of the Draft RAP through completion is as follows:

Activity/Task/Milestone	Date
RAP	
Submit Draft RAP to DTSC/CVRWQCB	December 27, 2013
Receive comments on Draft RAP from DTSC/CVRWQCB	April 8, 2014
Revised Draft RAP and submit Draft Final RAP to DTSC/CVRWQCB	October 24, 2014
Draft Final RAP appended to Draft Environmental Impact Report/Environmental Assessment (EIR/EA) for the SR-132 Project	December 2016
Public notice of availability of Draft Final RAP and the SR-132 Project EIR/EA for public review	January 18, 2017[1]
59-day public review	January 18, 2017 to March 17, 2017
Public hearing	February 22, 2017
DTSC responsiveness summary (response to public comments)[2]	March 2018
DTSC decision on Draft Final RAP	March 2018
SR-132 Project Design and Construction Phase	
SR-132 detailed design Plans, Specifications, and Estimates (PS&E) phase	2018
Preparation of Remedial Design Implementation Plan	2018
Construction of interim progress phase begins	2019
Complete interim progress phase	2020
Prepare Remedial Action Completion Report	2020
Complete ultimate build-out phase	2028
Prepare Remedial Action Completion Report (ultimate build-out phase)	2029

[1] Runs concurrently with the Caltrans Draft EIR/EA
[2] Joint Caltrans and DTSC Responsiveness Summary included in Final EIR/EA

9.0 HEALTH AND SAFETY PLAN

Although most of the COPCs have been demonstrated to be present in the stockpiles at concentrations generally less than residential health risk screening levels (and therefore much less than commercial/industrial or construction worker screening levels), barium is present at elevated concentrations. Therefore, an HSP will be prepared and implemented which will discuss the COPCs and appropriate precautions to limit exposure to them for onsite workers and nearby residents and businesses by implementing measures to control dust generation (water spray) and confirmation of this by air monitoring during construction. The HSP will also cover health and safety precautions for other worker hazards unrelated to the COPCs such as heat illness, lifting of heavy objects, slip/trip/fall hazards, equipment safety, and will provide emergency contacts and routes to the nearest hospital emergency room. A copy of the HSP will be kept on the Site at all times during the project.

Work at the Site will be performed in accordance with applicable State and Federal Occupational Health and Safety Standards set forth in 29 Code of Federal Regulations, Sections 1910 and 1926; and California Health and Safety Regulations as set forth in Title 8, California Code of Regulations, and guidance by DTSC. The provisions of the HSP will be mandatory for all Caltrans personnel and contractors and subcontractors at the Site.

Grading and other soil-related construction activities will not be required to be performed by Occupational Safety and Health Administration (OSHA) 40-hour health and safety trained personnel or contractors with Class A-HAZ licenses. However, health and safety awareness training will be provided through an initial site meeting and daily tailgate safety meetings.

10.0 CEQA

CEQA is being addressed through the EIR/EA *entitled: SR-132 West Freeway/Expressway Project*. The Final EIR/EA has been prepared and this Final RAP has been incorporated as a supplement to it. The Final EIR/EA describes the SR-132 project alternatives - Alternative 1, Alternative 2, and a No Build Alternative with Alternatives 1 and 2 being SR-99 off-ramp alternatives and not to be confused with remedial alternatives described in the RAP. The Finalt EIR/EA provides the public and decision-makers with detailed information about the Project's environmental effects, mitigation of significant environmental effects, and reasonable alternatives to the Project. The lead agency for the EIR/EA is Caltrans and the DTSC and CVRWQCB, as oversight agencies for the RAP, are responsible agencies for the EIR/EA for oversight and administration of regulatory requirements pertaining to contaminants in the stockpiles.

11.0 PUBLIC PARTICIPATION

The RAP process included several steps/activities and opportunities for public participation. The process included providing information about the project and the proposed remedy to the public, receiving public input, and responding to that input. The PEA included a community profile and described initial public participation efforts. Public informational meetings have been held including one at the Site on November 28, 2012. Caltrans maintains a website (http://www.dot.ca.gov/d10/x-project-sr132west.html) that provides access to project documents. The DTSC's EnviroStor websites (http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=60001626) and (http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=50280024) also provide access to project information, regulatory communications, and project documents.

The public participation activities that were performed as part of the RAP process included:

- preparing a base line community survey (DTSC);
- preparing a public participation plan (DTSC);
- publishing a public notice of the availability of the Draft SR-132 EIR/EA and Draft Final RAP for public review and comment and a public hearing in a local newspaper (Caltrans);
- distribution of a fact sheet describing the proposed remedy and the availability of the RAP for public review and comment (DTSC);
- conducting the public hearing during the 59-day public comment period (Caltrans); and
- publishing a response to comments (responsiveness summary) addressing the comments received during the public comment period (Caltrans and DTSC).

All comments received during the public comment period were responded to in writing and distributed to everyone who submitted a comment. The 59-day public review period began in January 2017. The RAP was not revised as a result of comments received. If significant changes to the Draft Final RAP had occurred, the RAP would have been revised and resubmitted for public review and comment. Because significant changes were not required to the Draft Final RAP, the DTSC requested submittal of this Final RAP for implementation.

12.0 LIMITATIONS

This Final RAP has been prepared solely for Caltrans and the DTSC and CVRWQCB in consideration of their requirements. Other parties may rely on the findings and conclusions of the RAP for informational purposes only. However, Caltrans, DTSC, CVRWQCB, and other parties who may rely on the findings and conclusions of the RAP should recognize that this RAP does not constitute a complete set of construction plans or specifications and should not be construed as such. The recommendations as presented in this RAP are predicated on the results of the sampling and laboratory testing performed to date.

The information contained herein is only valid as of the date of the RAP and would require an update to reflect additional site activities. Therefore, the RAP should only be deemed conclusive with respect to the information presented. No guarantee of the results of the studies used to generate the RAP is implied within the intent of this RAP or any subsequent report, correspondence or consultation, either express or implied. The services performed were conducted in accordance with the local standard of care in the geographic region at the time the services were rendered.

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