APPENDIX I

Borrow Site Environmental Conditions: South Sutter Property (APNs 201-0250-015, 201-0270-002 and -037), Novak Property (APN 225-0090-040), Huffstutler/Johnson Trust Property (APNs 225-0110-019, -020, -037)
Sacramento County, CA

BORROW SITE ENVIRONMENTAL CONDITIONS
SOUTH SUTTER/THORNTON PROPERTY
(APN 201-0250-015, 201-0270-002, -037)
NOVAK PROPERTY (APN 225-0090-040)
HUFFSTUTLER/JOHNSON TRUST PROPERTY
(APN 225-0110-019, -020, -037)
SACRAMENTO COUNTY, CALIFORNIA

August 17, 2009

A Report Prepared for:

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Kleinfelder Job No. 94582

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1 EXECUTIVE SUMMARY

An assessment of environmental conditions existing on three properties was conducted for the Sacramento Area Flood Control Agency (SAFCA). The three properties are identified as the South Sutter/Thornton (South Sutter), Novak, and Huffstutler/Johnson Trust (Huffstutler) properties. Levee improvements are proposed to be constructed on the properties as part of the Natomas Levee Improvement Program (NLIP). The properties are also proposed for use as sources of borrow soil during construction of the NLIP improvements. The NLIP encompasses approximately 45 perimeter miles of terrain with some interior reach. The Garden Highway is at the western and southern borders, the Natomas Cross Canal is at the northern border, and the East Levee Road and Natomas Road form the eastern border.

In summary, concentrations of pesticide residues, including organochlorine pesticides (OCPs) and arsenic, were detected in soil samples collected from the properties at concentrations that exceed some default environmental and human health risk screening levels. Consequently, Kleinfelder further evaluated the detected pesticide residues considering existing site conditions, proposed NLIP construction activities, and post-improvement land use.

Based on these factors, Kleinfelder believes concentrations of the OCP toxaphene that were detected in soil samples from the South Sutter and Novak properties do not currently pose ecological or human health risks requiring mitigation. It is also unlikely that the existing conditions on the site pose a threat to neighboring properties. Even so, ordinary dust control and worker personal hygiene practices will be required during construction activities to mitigate exposure of on-site construction workers, consistent with usual occupational health and safety requirements, and to prevent undue exposure of nearby off-site receptors. Evaluation of levee improvement construction activities, including use of the South Sutter and Novak properties for borrow soil, indicates that the work will not create health risks requiring mitigation or exacerbate existing environmental conditions, and may improve upon existing environmental conditions. The proposed land use for the South Sutter and Novak properties after construction is completed is expected to reduce ecological or human health risks relative to current conditions.

Kleinfelder concludes that concentrations of arsenic and the OCP dieldrin detected in soil samples from the Huffstutler property do not currently pose human health risks on the site requiring mitigation or remediation. It is also unlikely that current conditions on the site pose a threat to neighboring properties. The detected pesticide residue concentrations on the site are not inconsistent with accepted agricultural practices. However, the detected concentrations may present a long-term potential for ecological risk and are not appropriate for land uses that provide habitat for ecological receptors.

Commonly used dust control and worker personal hygiene practices are recommended during construction activities to reduce exposure of on-site construction workers and nearby off-site human populations to health risks associated with pesticide residues. With appropriate controls, levee improvement construction activities (which include use of the Huffstutler property for borrow soil) are not expected to pose risks requiring mitigation or remediation or exacerbate existing environmental conditions, but may improve upon current environmental conditions. Because the proposed land use for the Huffstutler property after construction will provide habitat for ecological receptors, the pesticide residues in the topsoil likely would pose excess ecological risks. The ecological risk posed by arsenic and dieldrin could be mitigated through removal and encapsulation by using the soil to construct the proposed seepage berm.

2 INTRODUCTION

The Natomas Levee Improvement Program (NLIP) encompasses approximately 45 perimeter miles of terrain with some interior reach. The Garden Highway is at the western and southern borders, the Natomas Cross Canal is at the northern border, and the East Levee Road and Natomas Road form the eastern border. As a part of the Area-Wide Due Diligence Assessment (DDA) for properties proposed for acquisition within the NLIP, SAFCA requested Kleinfelder evaluate environmental conditions in advance of acquisition and disturbance of the site for levee improvements.

Land use, both past and present, on the properties in the NLIP region is predominantly agricultural and rural residential. Given the long-term agricultural use, it is expected that physical features such as wells, underground pipelines for irrigation, and septic systems, and agricultural practices such as pesticide application would be associated with many of these properties. The proposed future development of the area is for levee improvement and protection of habitat for threatened and endangered species. Future land use may include a variety of options: excavation of borrow material for levee construction, continued agricultural production, conversion to grassland or forested habitat, marshland, and public utility levee construction. As land is converted from one use to another, it is prudent to consider potential issues such as whether residual pesticides from past operations are compatible with the proposed future land use, and whether there are short-term and/or long-term risks to human health or the environment associated with excavation and movement of soil during and following construction.

To assist SAFCA in evaluating potential environmental impacts associated with past and current uses of the properties, Kleinfelder conducted Phase I ESAs for properties proposed for acquisition. The Phase I ESAs were conducted in general accordance with the scope and limitations in ASTM E1527-05 and the State of California Department of Water Resources' *State-Federal Flood Control Systems Modification-Early Implementation Project-Land Acquisition Process* (S-FFCSM-EIP-LAP), and the All Appropriate Inquiry (AAI) standards of the Small Business Liability and Revitalization Act (the "Brownfields Law").

When the Phase I ESA results suggested additional evaluation was needed, Kleinfelder conducted limited surface soil sampling at specific properties to assess for the potential presence of pesticide residues typically associated with past agricultural land use. Soil samples collected at these properties were analyzed for pesticide residue compounds such as persistent organochlorine pesticides and the inorganic metals/metalloids arsenic, copper, and lead. If pesticide residues were detected, the concentrations were initially compared to the San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels (ESLs), May 2008 update (SFBRWQCB, 2008) as a means of assessing the need for further site investigation or mitigation. These ESLs are not intended to determine whether a condition is hazardous or must be reported to a regulatory agency. Rather, they are conservative values that can be used to screen whether a chemical can be assumed to not pose a significant, long-term threat to human health or the environment, or whether additional evaluation is warranted. Under most circumstances, when a chemical is present in soil or groundwater at concentrations below its corresponding ESL, it can be assumed to not pose a significant, long-term threat to human health or the environment. ESLs are discussed further in Section 4.3.

3 PURPOSE

The purpose of this report is to evaluate potential effects of environmental conditions on construction of the proposed levee and associated structures. The general approach used to evaluate environmental conditions for the NLIP is described in Section 2, Introduction. Specifically, this report summarizes the existing environmental conditions on three properties that were found during the initial screening process to warrant further assessment. The properties, and the associated assessor parcel numbers (APNs) are:

- South Sutter/Thornton property (APN 201-0250-015, 201-0270-002, -037)
- Novak property (APN 225-0090-040), and
- Huffstutler/Johnson Trust property (APN 225-0110-019, -020, -037)

Soil from these properties is proposed to be used as borrow material in the NLIP. Therefore SAFCA desires to evaluate potential effects of environmental conditions at these properties on construction of the proposed levee and associated structures.

Phase I ESAs were performed on the South Sutter, Novak, and Huffstutler properties. These properties historically have been used for agricultural purposes. No evidence was found to suggest that the properties were used for a purpose other than agriculture in those areas being evaluated for borrow material for the NLIP, with the exception of rural residential land use at the Huffstutler property since 1952. To support use of the properties for borrow soil during the NLIP construction, sampling was performed to evaluate current conditions associated with historical use of agricultural chemicals.

Concentrations of pesticide residues (organochlorine pesticides, arsenic, copper, and lead) were detected in soil samples collected from the properties. The pesticide residue concentrations appear to be consistent with concentrations found on fields at other agricultural properties. Further, they do not constitute a reportable condition or an imminent threat to public health, welfare or the environment. For these reasons, ESLs are considered an appropriate means of screening whether a residual pesticide can be assumed to not pose a significant, long-term threat to human health or the environment, or whether additional evaluation is warranted. Although some pesticide residue

concentrations exceeded ESLs, no evidence was found to suggest improper application or disposal of pesticides took place on the properties. In addition, none of the detected concentrations exceeded the California hazardous waste thresholds (e.g. Total Threshold Limit Concentrations and Soluble Threshold Limit Concentrations); therefore, site soil used as borrow material does not meet the definition of hazardous waste. Issues related to hazardous waste classification are discussed further in Section 5.5.3.

4 HUMAN HEALTH RISK EVALUATION

4.1 HUMAN HEALTH SCREENING AND REGULATORY LEVELS

The detected residual pesticide results were evaluated further by comparing to published screening level criteria (discussed below), in the context of planned future land uses. Consideration was made for the routes by which materials may be encountered by humans, resulting in exposure, and the potential for exposure to sensitive biota (i.e. mammals, birds, plants, etc.). For the purposes of this screening evaluation only, adjacent properties were assumed to be residential, which provides a conservative, health protective evaluation of potential impacts to both residents and workers. Where the default assumptions incorporated into development of published regulatory screening levels are inappropriate for site conditions, the default assumptions are modified to more accurately reflect site specific conditions, where possible.

4.2 EXISTING SITE CONDITIONS

Current site conditions at the South Sutter, Novak, and Huffstutler properties are described below. Evaluation of current conditions was based on the results of the Phase I ESA and limited soil sampling conducted to assess for the potential presence of residual pesticides on the areas proposed for use as borrow material.

4.2.1 South Sutter Property

Based on information reviewed during preparation of the Phase I Environmental Site Assessment (ESA) for the South Sutter property, the area evaluated for borrow material has been used for agricultural purposes dating to at least 1961 (Kleinfelder, 2009a, b). There was no evidence of other land uses on the area evaluated for borrow material revealed during the South Sutter property Phase I ESA. Based upon the Phase I ESA results, the proposed use as borrow material, and at the request of SAFCA, Kleinfelder conducted surface soil sampling to assess for the potential presence of residual pesticides associated with past agricultural use (Kleinfelder, 2009f).

Soil samples were collected from the South Sutter property in January and March 2009. The samples were submitted for laboratory analysis of OCPs, chlorinated herbicides, and the inorganic metals/metalloids arsenic, copper, and lead, which may be associated with pesticide mixtures. Detected concentrations were initially compared to the ESLs to screen for whether the chemical could be assumed to not pose a significant, long-term threat to human health or the environment, or whether additional evaluation was warranted.

Composite surface soil samples collected at the South Sutter property came from the upper 6 inches of soil. The OCP toxaphene was detected in four of eight composite surface samples (4:1 composites) at concentrations ranging from 36 to 190 micrograms per kilogram (ug/kg, or parts per billion, ppb). The detected concentrations of toxaphene exceeded the ESL of 0.42 ug/kg. The ESL for toxaphene is based on potential leaching from soil and migrating to surface water with subsequent impact to aquatic habitat, and is more conservative than values for protection of soil habitat or for human health. Discrete soil samples collected from greater depths did not contain detectable concentrations of toxaphene. In addition, the OCP dieldrin was detected in one composite sample at a concentration of 6.1 ug/kg, which exceeded the ESL of 2 ug/kg. Dieldrin was not detected in the other composite or discrete soil samples. The OCP DDD (a breakdown product of DDT) and DDE were detected in one and three composite soil samples respectively, and these concentrations were below their respective ESLs. Therefore, further evaluation of DDD and DDE is not included in this evaluation.

Arsenic was detected in each soil sample at concentrations ranging from 4.1 to 11 milligrams per kilogram (mg/kg, or parts per million, ppm). While these concentrations exceeded the ESL of 0.39 mg/kg, they are consistent with typical background concentrations for arsenic in Central Valley alluvium (commonly 5 to 10 mg/kg) (USGS, 1984, DTSC, undated). Copper and lead were detected in each soil sample at concentrations well below their respective ESLs (Kleinfelder, 2009f).

Results for the pesticide residues of potential concern are summarized in the table below.

South Sutter Property					
Analyte	Analytical Results (mg/kg)				SF RWQCB ESL
	Minimum	Maximum	Mean	Geometric Mean	
Topsoil (0 – 6 inches)					
Arsenic	6.6	9.3	7.6	7.5	0.39
Toxaphene	ND(0.020)	0.19	0.067	0.032	0.00042
Dieldrin	ND(0.0010)	0.0061	0.0014	0.00093	0.0023
Subsurface Soil (6 – 12 inches)					
Arsenic	4.1	11	7.6	7.5	0.39
Toxaphene	ND(0.020)	ND(0.020)	---	---	0.00042
Dieldrin	ND(0.0010)	ND(0.0010)	---	---	0.002

ND: Not detected. Reporting Limit in ( )
Values for OCPs reflect conversion of units from µg/kg to mg/kg
Mean: arithmetic average, the sum of n numbers divided by n, which is a measure of central tendency.
Geometric mean: the n^{th} root of the product of n numbers, which is another measure of central tendency that tends to give greater weight to smaller numbers.

At California agricultural properties, detected concentrations of toxaphene typically range between 0.01 and 5.97 mg/kg. Dieldrin typically ranges between 0.004 to 0.031 mg/kg (DTSC, 2008a). The maximum detected concentration of toxaphene at the South Sutter property was 0.19 mg/kg. This concentration is within the range DTSC observed at other agricultural sites and is less than residential human health benchmarks, including the California Human Health Screening Levels (Cal EPA, 2005). Therefore, the soil concentrations at South Sutter do not indicate a release to the environment that would represent an Imminent and Substantial Endangerment according to DTSC (DTSC, 1993).

The single detection of dieldrin of 0.0061 mg/kg at the South Sutter property is within the concentration range observed by DTSC at agricultural properties. The concentration at this property does not constitute a reportable condition or an imminent threat to public health, welfare or the environment.

4.2.2 Novak Property

Based on information reviewed during the Phase I ESA for the Novak property, the area evaluated for borrow material has been used for agricultural purposes dating to at least 1922 (Kleinfelder, 2009c). There was no evidence of other land uses on the area evaluated for borrow material revealed during the Novak property Phase I ESA. Based upon the Phase I ESA results, the proposed use as borrow material, and at the request of SAFCA, Kleinfelder conducted surface soil sampling to assess for the potential presence of residual pesticides associated with past agricultural use (Kleinfelder, 2009g).

Soil samples were collected from the Novak property in September 2008 and in April and July 2009. The samples were submitted for laboratory analysis of OCPs, chlorinated herbicides, and the inorganic metals/metalloids arsenic, copper, and lead, which may be associated with pesticide mixtures. The analytical results are summarized below. Detected concentrations were initially compared to the ESLs to screen for whether the chemical could be assumed to not pose a significant, long-term threat to human health or the environment, or whether additional evaluation is warranted.

At the Novak property, composite samples were collected from the upper 6 inches of soil (shallow soil). Toxaphene was detected in the five composite surface soil samples at concentrations that ranged from 110 to 140 ug/kg. Additionally, discrete soil samples also collected from 0 to 6 inches below ground surface (bgs) contained detectable toxaphene concentrations ranging from 46 to 160 ug/kg; these results are consistent with the composite sample results. Discrete soil samples collected in the interval from 6 inches to one foot bgs contained detectable toxaphene concentrations ranging from 23 to 220 ug/kg, which exceed the ESL of 0.42 ug/kg. Discrete soil samples collected from depths greater than one foot bgs did not contain detectable concentrations of toxaphene (laboratory reporting limit of 20 ug/kg). No other OCPs were detected in soil samples collected from the proposed borrow area on the Novak property.

Arsenic was detected in each soil sample at concentrations ranging from 6.1 to 10 mg/kg. These concentrations are consistent with typical background concentrations for arsenic in Central Valley alluvium (USGS, 1984, DTSC undated). Copper and lead

were detected in each sample at concentrations well below their respective ESLs (Kleinfelder, 2009g).

Results for the pesticide residues of potential concern are summarized in the following table.

Novak Property					
	Analytical Results (mg/kg)				SF RWQCB ESL
Analyte	Minimum	Maximum	Mean	Geometric Mean	
Topsoil (0 – 6 inches)					
Arsenic	7.6	8.5	8.1	8.1	0.39
Toxaphene	0.046	0.16	0.11	0.11	0.00042
Subsurface Soil (6 – 12 inches)					
Arsenic	NA	NA	---	---	0.39
Toxaphene	0.023	0.22	0.14	0.14	0.00042
Subsurface Soil (1.0 - 1.5 feet)					
Arsenic	6.1	10	8.3	8.2	0.39
Toxaphene	ND(0.020)	ND(0.020)	---	---	0.00042

ND: Not detected. Reporting Limit in ( )
NA: Not analyzed for the indicated constituent.
Values for OCPs reflect conversion of units from µg/kg to mg/kg
Mean: arithmetic average, the sum of n numbers divided by n, which is a measure of central tendency.
Geometric mean: the n^{th} root of the product of n numbers, which is another measure of central tendency that tends to give greater weight to smaller numbers.

The maximum detected concentration of toxaphene at the Novak property was 0.22 mg/kg. This concentration is within the range observed by DTSC at other agricultural sites (DTSC, 2008a) and is less than residential human health benchmarks, including the California Human Health Screening Levels (Cal EPA, 2005). Therefore, the soil concentrations do not indicate a release to the environment that would represent an Imminent and Substantial Endangerment according to DTSC (DTSC, 1993).

4.2.3 Huffstutler Property

Based on information reviewed during the Phase I ESA for the Huffstutler property, the area evaluated for borrow material was used for agricultural purposes since at least 1952 (Kleinfelder, 2009d). There was no evidence of other land uses on the area evaluated for borrow material revealed during the Huffstutler property Phase I ESA. A

limited Phase II ESA was conducted by another consultant at the site during 2006 (WKA, 2006). This Phase II ESA revealed the presence of detectable concentrations in soil of the OCPs dieldrin, DDT, and DDE (a breakdown product of DDT), as well as concentrations of arsenic and lead in excess of likely background concentrations. Based upon the Phase I ESA results, the proposed use as borrow material, and at the request of SAFCA, Kleinfelder conducted surface soil sampling to assess for the potential presence of residual pesticides associated with past agricultural use (Kleinfelder, 2009e). Soil samples were collected from the Huffstutler property in January, February, and July 2009. The samples were submitted for laboratory analysis of OCPs, chlorinated herbicides, and the inorganic metals/metalloids arsenic, copper, and lead, which may be associated with pesticide mixtures. The analytical results are summarized below. Detected concentrations were initially compared to the ESLs to screen for whether the chemical could be assumed to not pose a significant, long-term threat to human health or the environment, or whether additional evaluation is warranted.

Composite samples were collected at the Huffstutler property from the upper 6 inches of soil (shallow soil) on site. Dieldrin was detected in the nine composite surface samples collected from the southernmost parcel (APN 225-0110-036) at concentrations ranging from 20 to100 ug/kg. Discrete samples collected from a depth of 1 to 1.5 feet bgs did not contain detectable concentrations of dieldrin. In addition, DDT and DDE were detected in the nine composite samples, but at concentrations well below their respective ESLs; DDD was detected in 6 of 9 composite samples at concentrations below its ESL. Toxaphene was not detected in soil samples collected from the Huffstutler property.

Arsenic was detected in each composite soil sample at concentrations ranging from 12 to 36 mg/kg. Based on DTSC's estimated background concentrations for arsenic in soil in California, these concentrations were judged to exceed typical background concentrations for arsenic in Central Valley alluvium. Discrete soil samples collected from 6 inches to 1 foot bgs contained detectable arsenic concentrations ranging from 6.3 to 43 mg/kg. Discrete soil samples collected from 1 to 1.5 feet bgs contained detectable arsenic concentrations ranging from 7.3 to 36 mg/kg. Discrete soil samples collected between 1.5 and 2 feet bgs contained detectable arsenic concentrations ranging from 5.4 to 12 mg/kg; concentrations at this depth appear to be consistent with typical background concentrations in Central Valley alluvium (DTSC, undated).

Copper and lead were detected at concentrations well below their respective ESLs (Kleinfelder, 2009e).

Results for the pesticide residues of potential concern are summarized in the table below.

Toxaphene was not detected at the Huffstutler property. The range of detected dieldrin concentrations at the Huffstutler property, 0.02 to 0.1 mg/kg, is greater than the range of dieldrin concentrations found by DTSC at other agricultural properties, which typically ranges between 0.004 to 0.031 mg/kg (DTSC, 2008a). The concentrations at this property do not constitute a reportable condition or an imminent threat to public health or welfare or the environment; nevertheless, these results may indicate it is appropriate to manage site soils to control the presence of dieldrin.

Huffstutler Property (APN 225-0110-020 & -036)					
	Analytical Results (mg/kg)				SF RWQCB ESL
Analyte	Minimum	Maximum	Mean	Geometric Mean	
Topsoil (0 – 6 inches)					
Arsenic	12	36	24	22	0.39
Dieldrin	0.020	0.10	0.049	0.044	0.0023
Subsurface Soil (6 – 12 inches)					
Arsenic	6.3	43	22	19	0.39
Dieldrin	NA	NA	---	---	0.0023
Subsurface Soil (1.0 - 1.5 feet)					
Arsenic	7.3	36	15	12	0.39
Dieldrin	ND(0.0010)	ND(0.0010)	---	---	0.0023
Subsurface Soil (1.5 - 2.0 feet)					
Arsenic	5.4	12	7.7	7.5	0.39
Dieldrin	NA	NA	---	---	0.0023

ND: Not detected. Reporting Limit in ( )
NA: Not analyzed for the indicated constituent.
Values for OCPs reflect conversion of units from µg/kg to mg/kg
Mean: arithmetic average, the sum of n numbers divided by n, which is a measure of central tendency.
Geometric mean: the n^{th} root of the product of n numbers, which is another measure of central tendency that tends to give greater weight to smaller numbers.

4.3 PROJECT IMPACTS

As discussed in Section 4.2, concentrations of pesticide residues detected in soil were compared to ESLs to evaluate the potential for human and ecological risk. Because some ESLs were exceeded on each of the three properties, additional evaluation of potential risks was conducted. Identification of potentially-exposed human populations, exposure pathways, and project-specific screening levels is discussed in this section as well as in Section 4.5.

The NLIP involves implementation of flood protection measures for existing levees along the Sacramento River east levee. This is proposed to be accomplished by construction of a new, larger levee adjacent to and on the landside of the existing levee. Depending on native soil conditions and site access restrictions, additional measures may include construction of seepage berms or cutoff walls. Construction involves stripping approximately 1 foot of vegetative matter and topsoil from the landside toe of the existing levee within the footprint of the new adjacent levee. Suitable soil for construction of the levee will be excavated from several borrow sites, including the three properties discussed in this report. Borrow activities generally will consist of stripping and stockpiling topsoil, followed by excavation, transportation, and placement of borrow within the new adjacent levee. Additional borrow soil will be used to construct seepage berms where they are needed. Stockpiled topsoil generally will be returned to the borrow excavation and re-spread.

The future land uses of these three properties (continued agricultural production, grassland or forested habitat, marshland, temporary construction staging and public utility levees) are expected to result in minimal human exposure to residual pesticides.

There is a potential for construction workers to be exposed by direct contact with soil containing pesticide residues during earthwork. Additionally, unmitigated fugitive dust emitted from the sites during construction could migrate in ambient air to adjacent properties. Considering these future land uses and potential exposure for humans, soil screening levels were selected for the following media and routes of exposure:

- Over a long-duration exposure, dust emitted to ambient air at off-site residential property during agricultural land use;

- Over a short duration exposure, construction workers coming into direct contact with soil from various depths, and dust emitted to ambient air during earthmoving operations;

During the development of the SFBRWQCB ESLs for individual constituents, various potentially exposed populations and exposure pathways were evaluated for each constituent. In general, the ESL for a particular constituent represents the lowest value among the several screening levels that were developed for the potentially exposed populations and exposure pathways that were evaluated. Because different populations are not all affected in the same way by various constituents, the population and exposure pathway represented by the ESL for one constituent may not be the same population and pathway as for another constituent. The ESL tables include soil screening levels for construction worker direct contact with pesticide residues in soil. These screening levels were selected for comparison to site concentrations in order to evaluate potential risk to on-site human populations during construction.

In addition to using ESLs to evaluate direct contact risk for construction workers, other criteria were used to evaluate potential risks related to pesticide residues in airborne dust. The United States Occupational Health and Safety Administration (OSHA) published permissible exposure limits (PELs) for the pesticide residuals that were detected on the properties, and for airborne particulates (dust). The PELs are standards that can be used for evaluating construction worker exposure to pesticide residues in airborne dust.

The California Environmental Protection Agency (Cal EPA) Office of Environmental Health Hazard Assessment (OEHHA) has published short-term ambient air exposure standards for several constituents, including arsenic. OEHHA has established Acute and 8-hour Reference Exposure Levels (RELs) for arsenic of 0.2 $\mu g/m^3$ and 0.015 $\mu g/m^3$, respectively (OEHHA 2008). The RELs can be used as monitoring standards for off-site dust emissions during construction activities. However, OEHHA has not established RELs for toxaphene or dieldrin. The USEPA Region IX Regional Screening Level tables (RSLs, USEPA, 2009) include ambient air screening levels for toxaphene and dieldrin that can be used to evaluate potential exposures of residential populations in lieu of RELs. The RSLs consider long-term (chronic) exposures, and so are more conservative than short-term standards, such as the Acute and 8-hour RELs.

The RSL residential ambient air screening levels may be used by site managers as potential air monitoring standards for off-site dust emissions during and after on-site construction activities.

Table 1 (attached) presents the human health screening levels for arsenic, dieldrin, and toxaphene for residential and commercial/industrial exposures, and for construction workers.

Table 2 (attached) presents the minimum values for arsenic, dieldrin, and toxaphene selected as the project specific, human health screening levels for future land uses and potentially exposed populations.

Table 3 (attached) describes how RELs and RSLs were used to develop airborne dust monitoring goals to protect off-site residential populations. Airborne dust mitigation is discussed further in Section 4.5.

The project-specific screening values for each route of potential exposure for human populations are presented in the following for exposures of construction workers and off-site residential populations during construction activities.

Project-Specific Screening Levels
Human Populations

Pesticide Residue	SFBRWQCB ESL Construction Worker Direct Contact (mg/kg)	OSHA PEL Construction Worker Ambient Air (µg/m^3)	OEHHA REL Off-Site Ambient Air (µg/m^3)	USEPA Region 9 RSL Off-Site Ambient Air (µg/m^3)
Arsenic	15	10	0.2 (acute) 0.015 (8-hour)	0.00057[a]
Dieldrin	1.6	500	NA	0.00053
Toxaphene	22	250	NA	0.0076

Notes:
[a]Presented for reference, but not used for screening.
NA: Not applicable
ESL: Values from SFBRWQCB ESL Table K-3, with HQ of 1.
PEL: OSHA Permissible Exposure Limit
REL: Reference Exposure Levels: values from OEHHA Technical Support Document for Derivation of Noncancer Reference Exposure Levels, Appendix D
RSL: Residential Screening Levels: values from USEPA RSLs for ambient air concentrations.

4.4 CONCLUSIONS

The results of limited Phase II ESAs performed on the three properties revealed the presence of detectable concentrations of the OCPs toxaphene and dieldrin, as well as arsenic elevated above background concentrations. The concentrations exceed ESLs that account for all potentially exposed populations. Project-specific screening levels (presented in Section 4.3) were developed to allow consideration of the potential exposure of construction workers and off-site residents. Conclusions regarding the potential risks to human receptors are presented in the following paragraphs. Mitigation measures are described Section 4.5.

Airborne concentrations of the detected pesticide residues may pose an unacceptable risk to site workers and off-site populations under some conditions. Mitigation of potential human health risks posed by airborne concentrations is discussed in Section 4.5.

4.4.1 South Sutter Property

Toxaphene was detected in soil on the South Sutter property. The maximum detected concentration of toxaphene at the site was 0.19 mg/kg. The maximum detected concentration is less than the project-specific screening level for construction worker direct contact. Under foreseeable conditions, current toxaphene concentrations do not pose a human health risk to neighboring properties requiring mitigation. Further, appropriate fugitive dust controls for construction activities will mitigate exposure and potential health risks for construction workers and neighboring populations. Fugitive dust mitigation is discussed in Section 4.5.

4.4.2 Novak Property

Toxaphene also was detected in soil on the Novak property. The maximum detected concentration of toxaphene in surface soil at the site was 0.22 mg/kg, which also is less than the project-specific screening level for construction worker direct contact. Under foreseeable conditions, current toxaphene concentrations do not pose a human health risk to neighboring properties requiring mitigation. Further, appropriate fugitive dust controls for construction activities will mitigate exposure and potential health risks for

construction workers and neighboring populations. Fugitive dust mitigation is discussed in Section 4.5.

4.4.3 Huffstutler Property

Dieldrin was detected in surface soil on the Huffstutler property. The maximum detected concentration of dieldrin in surface soil at the site was 0.10 mg/kg, which is below the project-specific screening level for construction worker direct contact. Under foreseeable conditions, current dieldrin concentrations do not pose a human health risk to neighboring properties requiring mitigation and are not expected to pose an unacceptable direct contact risk to construction workers. Further, appropriate fugitive dust controls for construction activities will mitigate exposure and potential health risks for construction workers and neighboring populations. Fugitive dust mitigation is discussed in Section 4.5.

Arsenic was detected at concentrations greater than the background concentration in soil samples collected from the Huffstutler property. The maximum detected arsenic concentration was 43 mg/kg, which exceeds the project-specific construction worker direct contact health risk screening level. Arsenic could pose a potential direct contact threat to construction workers if left unmitigated. Unmitigated fugitive dust emitted during construction work could expose construction workers and neighboring populations to arsenic in soil. Mitigation measures are described below. Agricultural activities have a lower dust emission factor than construction activities (refer to Section 4.5.3, below). Under current and foreseeable agricultural use conditions, arsenic does not pose a human health risk to neighboring properties requiring mitigation.

4.5 MITIGATION

Considering the current environmental conditions at the three properties, the selection of mitigation measures during construction of the proposed levee and associated structures should consider the following:

- Soil management implications concerning possible worker exposure during construction, which should be accomplished using best management practices for occupational exposures.

- Soil management implications concerning fugitive dust emitted during construction, which again can be accomplished using established best management practices for reducing dust generation during construction.

- Soil management implications concerning fugitive dust emitted by agricultural operations if any of the properties are returned to agricultural use after construction.

4.5.1 Construction Worker Protection During Construction

Earthwork during NLIP construction activities has the potential to emit fugitive dust containing residual pesticides. At high enough concentrations, residual pesticides in fugitive dust could pose an unacceptable risk to on-site construction workers. If not controlled, fugitive dust could also migrate beyond property boundaries and expose off-site residents during construction work. Should site properties continue to be used for agricultural production, dust could be emitted during crop management and expose agricultural workers and affect off-site residential ambient air. Therefore, potential risks to on-site workers and off-site residents were evaluated to determine the need for dust monitoring or control measures.

The objective of dust control measures is to limit airborne particulate (fugitive dust) concentrations to mitigate worker exposure. As previously mentioned, OSHA published PELs for the pesticide residuals that were detected on the properties, and for airborne particulates (dust). A project-specific airborne particulate concentration was calculated for comparison to OSHA PELs. The project-specific airborne particulate concentration for each pesticide residue was calculated in the following equation (adapted from DTSC 2006) by dividing the maximum detected soil concentration of arsenic, dieldrin, and toxaphene by the DTSC Particulate Emission Factor (PEF) for construction work, 1,000,000 m^3/kg (DTSC, 2005b):

Construction Work Ambient Air Dust ($\mu g/m^3$) =

$$\frac{\text{Soil Concentration (mg/kg) x 1000 µg/mg}}{\text{Construction PEF of 1,000,000 } (m^3/kg)}$$

The calculated ambient air concentration of each pesticide residue is compared to their respective OSHA PELs in the table below. The constituent Particulates - Not Otherwise Specified (NOS) represents the OHSA PEL for dust in a worker's ambient air.

Evaluation of Worker Exposure for Short Duration Soil Management

Pesticide Residue	Maximum Detected Soil Concentration (mg/kg)	Calculated Ambient Air Concentration ($\mu g/m^3$)	OSHA PEL TWA ($\mu g/m^3$)
Arsenic	43	0.043	10
Dieldrin	0.10	0.0001	500
Toxaphene	0.22	0.00022	250
Particulate, NOS	NA	NA	5000

mg/kg – milligrams per kilogram
$\mu g/m^3$ – micrograms per cubic meter of air
TWA – 8-hour time weighted average
NOS – not otherwise specified (i.e., dust)
NA – not applicable

Based upon the results above, protection of workers during construction work would be achieved by limiting dust emissions to the Particulate NOS standard of 5 mg/m^3. At a concentration of 5 mg/m^3 Particulate NOS, ambient air concentrations of arsenic, dieldrin, and toxaphene will be at least an order of magnitude less than their respective OSHA PELs.

4.5.2 Off-Site Resident Protection During Construction

Dusts generated during on-site construction work could migrate to the breathing zone of off-site residents and cause a short duration exposure through inhalation of the dust. Management of dust emissions for the protection of construction workers will minimize dust migration to off-site residential ambient air. However, out of an abundance of caution, dust monitoring at the project fenceline adjacent to residential properties may be conducted to evaluate compliance with an Acute Fenceline Particulate NOS goal of 4.5 mg/m^3 and an 8-hour Fenceline Particulate NOS goal of 0.3 mg/m^3. These acute and 8-hour dust concentration goals are based upon the OEHHA Acute and 8-hour RELs for arsenic of 0.2 $\mu g/m^3$ and 0.015 $\mu g/m^3$ (OEHHA 2008), respectively, and the

assumption that the source of dust in off-site residential air is soil containing 43 mg/kg of arsenic[1]. At these Acute and 8-hour Particulate NOS goals, the ambient air concentration of dieldrin and toxaphene would be below the long-duration exposure screening limits for residential ambient air, and therefore do not require additional monitoring or mitigation of dust. Table 3 presents the calculation and identification of the Fenceline Particulate NOS goals.

Normal dust control measures (soil wetting, etc.) should be sufficient for achieving protection of construction workers and off-site residents. Periodic airborne particulate monitoring can be performed during earthwork activities to demonstrate compliance with the project-specific Particulate NOS concentrations. Airborne particulate monitoring should be performed in the on-site workers' breathing zone using the Particulate NOS standard of 5 mg/m^3 as well as at the project boundaries using the Acute Fenceline Particulate NOS goal of 4.5 mg/m^3 and an 8-hour Fenceline Particulate NOS goal of 0.3 mg/m^3.

4.5.3 On-Site Agricultural Worker and Off-Site Resident Protection During Continued Agricultural Land Use

Should future land use include continued agricultural production, site soils could be emitted as dust during crop management. This dust could migrate to the breathing zone of on-site agricultural workers and off-site residential properties. To evaluate the risk to on-site agricultural workers and off-site residents, pesticide residue concentrations in ambient air were calculated and compared to residential ambient air screening levels. The ambient air pesticide residue concentrations that may result from continued agricultural use were calculated using the maximum soil concentrations present under current conditions and the DTSC PEF for commercial and industrial properties (DTSC, 2005b) in the following equation (adapted from DTSC 2006):

[1] *OEHHA defines Acute REL as the level at which intermittent one-hour exposures are not expected to result in adverse health effects with an exposure averaging time of one hour. The 8-hour REL is a concentration at or below which adverse noncancer health effects would not be anticipated for repeated 8-hour exposures which might include daily occupational, in-home or in-school exposures. For 8-hour RELs, the exposure averaging time is 8 hours, which may be repeated (OEHHA 2008).*

Agricultural Use Dust ($\mu g/m^3$) =

$$\frac{\text{Soil Concentration (mg/kg) x 1000 µg/mg}}{\text{Commercial/Industrial PEF of 1,000,000,000 } (m^3/kg)}$$

Evaluation of On-Site Worker and Off-Site Residential Risk Exposure for Long-Duration Agricultural Land Use

Pesticide Residue	Maximum Detected Soil Concentration (mg/kg)	Agricultural Land Use Ambient Air Concentration ($\mu g/m^3$)	Residential Ambient Air Screening Level ($\mu g/m^3$)
Arsenic	43	0.000043	0.00057
Dieldrin	0.10	0.0000001	0.00053
Toxaphene	0.22	0.00000022	0.0076

mg/kg – milligrams per kilogram
$\mu g/m^3$ – micrograms per cubic meter of air

Based upon these results above, future agricultural use of site properties is expected to pose little to no human health risk.

Application of best management practices in all operational aspects of soil management associated with soil containing these levels of residual pesticides is advisable. These activities should be performed in such a manner that minimizes worker exposure and fugitive dust generation and tracking of soil away from the site. Construction work should be done in accordance with applicable local, state, and federal regulations to protect worker health and safety. The site engineer or manager should have a qualified professional prepare an appropriate construction site-specific health and safety plan, which can then serve as the basis for task or activity-specific health and safety plans, if they are needed. The plans should include provisions for potential contact with pesticide residues at the levels identified herein.

5 ECOLOGICAL ASSESSMENT

5.1 ECOLOGICAL SCREENING LEVELS

As mentioned in Section 4, the detected residual pesticide concentrations were evaluated further by comparing to published screening level criteria, in the context of planned future land uses. Consideration was made regarding the potential for the routes by which exposure to sensitive biota (i.e. mammals, birds, plants, etc.) may take place.

Future land uses of these three properties as grassland or forested habitat and public utility levees may contribute to ecological exposure. For this reason the presence and vertical distribution of arsenic, dieldrin and toxaphene were evaluated for possible routes of exposure to wildlife and other biota. Birds, plants, mammals, soil invertebrates, and microbes may potentially come in contact with surface soils from a depth of 0 to 1 foot bgs. In addition, plants, microbes, and soil invertebrates may come in contact with deeper soils; but mammals (such as voles) served as the critical biota for deeper soil due to the tendency of chlorinated pesticides to biomagnify in the food chain and the sensitivity of mammals to elevated exposure to these pesticides.

The potential for residual pesticides to leach from level-graded soils into deeper soil horizons or groundwater, or to be carried by overland flow is an understandable concern, particularly for the potential to migrate into and potentially impact nearby surface waters. However, soil located within and on the public utility levee is unlikely to leach to groundwater because levee construction is designed to minimize water infiltration. Additionally, based upon discussions with SAFCA, Kleinfelder understands that the replanted habitats and levees are to be designed and maintained to minimize potential migration of surface soils as sediment in surface water run-off.

Both USEPA Region V Ecological Screening Levels (Eco-SLs, USEPA, 2003, 2005, 2007) and the National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQuiRTs, NOAA, 2008) were used to screen for soil levels that are likely to be protective of ecological populations.

5.2 EXISTING SITE CONDITIONS

Existing site conditions were discussed previously in Section 4.2 of this report. The concentrations and distribution of pesticide residues are briefly restated in the following paragraphs.

5.2.1 South Sutter Property

The maximum detected concentration of toxaphene at the South Sutter property was 0.19 mg/kg. This concentration is within the range DTSC observed at other agricultural sites (DTSC, 2008a). Therefore, the soil concentrations at South Sutter do not indicate a release to the environment that would represent an Imminent and Substantial Endangerment according to DTSC (DTSC, 1993).

The single detection of dieldrin of 0.0061 mg/kg at the South Sutter property is within the concentration range observed by DTSC at agricultural properties. The concentration at this property does not constitute a reportable condition or an imminent threat to public health, welfare or the environment.

Arsenic at the South Sutter property was not detected at concentrations judged to be elevated relative to background.

5.2.2 Novak Property

The maximum detected concentration of toxaphene at the Novak property was 0.22 mg/kg. This concentration is within the range observed by DTSC at other agricultural sites (DTSC, 2008a). Therefore, the soil concentrations do not indicate a release to the environment that would represent an Imminent and Substantial Endangerment according to DTSC (DTSC, 1993).

Arsenic at the Novak property was not detected at concentrations judged to be elevated relative to background.

5.2.3 Huffstutler Property

Toxaphene was not detected at the Huffstutler property. The range of detected dieldrin concentrations at the Huffstutler property, 0.02 to 0.1 mg/kg, is greater than the range of dieldrin concentrations found by DTSC at other agricultural properties, which typically ranges between 0.004 to 0.031 mg/kg (DTSC, 2008a). The concentrations at this property do not constitute a reportable condition or an imminent threat to public health or welfare or the environment; nevertheless, these results may indicate it is appropriate to manage site soils to control the presence of dieldrin.

Arsenic was detected in soil samples collected from the upper 1.5 feet at concentrations ranging from 6.3 to 43 mg/kg. These concentrations were judged to exceed background concentrations.

5.3 PROJECT IMPACTS

NLIP construction activities were briefly described in Section 4.3.

Considering future land uses and potential exposure for biota, soil screening levels were selected for the following media and routes of exposure:

- Surface soil from 0 to 1 foot bgs for wildlife and other biota;
- Subsurface soil from 1 to 2 feet bgs for mammalian receptors; and
- Level-graded soils for potential leaching to groundwater and migration to surface water aquatic habitat ecological receptors.

As described in Section 4.3, the ESLs (SFBRWQCB, 2008) for each constituent were established as the lowest screening levels from among several potential receptors and exposure pathways. Some of the generic assumptions that were made in evaluating exposure pathways are overly conservative for conditions on the three properties evaluated in this report. The following paragraphs describe how certain assumptions were modified for the purpose of this report to better represent site conditions.

The ESL table screening levels for dieldrin and toxaphene rely upon a model for predicting soil concentrations potentially leaching to groundwater and subsequently migrating to surface water aquatic habitat ecological populations. The ESL soil leach model describes the dissolution of chemicals into rain water infiltrating the soil and subsequently diluting and naturally attenuating during migration to groundwater and to the surface water.

The background concentration of arsenic at agricultural sites in southern California was estimated by DTSC as 11.3 mg/kg (DTSC, 2005, 2008b). The applicability of this background concentration to other regions of California is consistent with reports of naturally occurring concentrations of metals in California (Bradford et al 1996 and Hunter et al 2005). Therefore, the DTSC value was used herein as an assumed lower limit soil screening level for arsenic.

Table 1 (attached) presents the ecological screening levels for arsenic, dieldrin, and toxaphene.

It is important to note that the SFBRWQCB ESLs for soil leaching to surface water aquatic habitats do not appear to represent conditions at the project sites. The ESL model predicts the downward migration of dieldrin and toxaphene in soil. However, the vertical concentration profile of dieldrin and toxaphene, which decreases with depth, indicates these chemicals do not leach particularly well in these soils.

Two ESL soil leaching model input values were identified as critical variables. The ESL model assumes the presence of a very low fraction of organic carbon (f_{oc}) in soils. The low f_{oc} value was chosen by SFBRWQCB to represent a relatively clean sand (f_{oc} of 0.001 grams per gram of soil, g/g). The actual f_{oc} for agricultural property is likely to be much greater since agricultural practice strives to increase the organic carbon content in order to promote crop productivity. As a comparison, the California DTSC Preliminary Endangerment Assessment manual (PEA, DTSC, 1994) uses a default f_{oc} value of 0.02 g/g and was chosen by DTSC to represent surface soils.

The other critical ESL soil leach model variable is the chemical-specific organic carbon equilibrium constant, K_{oc}, in units of cubic centimeters per gram, cm^3/g. The ESL K_{oc} value for dieldrin is given as 7,400 cm^3/g and for toxaphene as 4,900 cm^3/g. In contrast,

the USEPA RSL chemical constants table, based upon published peer-reviewed data, gives the dieldrin and toxaphene K_{oc} values as 10,600 cm^3/g and 99,300 cm^3/g, respectively (USEPA, 2009). The ESL model description states that chemicals with a K_{oc} value of 30,000 cm^3/g or greater will tightly bind to soil and are unlikely to leach to deeper soils or groundwater. Because site-specific data show dieldrin and toxaphene as not detected below depths at which agricultural practice is likely to mix soil, it supports the conclusion that dieldrin and toxaphene are unlikely to leach to groundwater under site-specific conditions.

Therefore, the ESL soil leach model was re-evaluated for dieldrin and toxaphene concentrations protective of surface water aquatic habitat. The Phase I and II site assessments did not evaluate f_{oc} in surface soils, therefore the highly conservative f_{oc} value of 0.001 g/g was not altered. The ESL model was re-evaluated by substituting the ESL K_{oc} value for dieldrin and toxaphene with USEPA RSL K_{oc} values. Re-calculating the ESL soil screening level protective of aquatic habitat ecological populations changes the default dieldrin ESL value from 0.0023 mg/kg to a project-specific ESL soil leaching screening value of 0.0033 mg/kg and the default toxaphene ESL value from 0.00042 mg/kg to a project-specific ESL soil leaching screening value of 93 mg/kg. These re-calculated ESL soil leaching screening values are presented below and in Table 2, and are the project-specific soil leaching screening values selected for evaluation in this report.

The project-specific screening values for each route of potential exposure for ecological populations are presented below:

Project-Specific Screening Levels
For Ecological Populations

Pesticide Residue	Surface soil 0-1 ft bgs (mg/kg)	Subsurface Soil 1-2 ft bgs (mg/kg)	Soil Leaching All depths (mg/kg)
Arsenic	11.3	11.3	11.3
Dieldrin	0.0024	0.0024	0.0033
Toxaphene	0.119	0.119	93

Notes:
Surface soil: values for dieldrin and toxaphene are the minimum values from sources listed in Table 1. Arsenic value is the California background value for agricultural land uses.

Subsurface soil: values for ecological risk include mammals only.

Soil Leaching All Depths: values for dieldrin and toxaphene were calculated using the ESL soil leaching model and K_{oc} values from the USEPA RSL chemical constants table.

5.4 CONCLUSIONS

The results of limited Phase II ESAs performed on the three properties revealed the presence of detectable concentrations of the OCPs toxaphene and dieldrin, as well as arsenic elevated above background concentrations. The concentrations exceed ESLs. Project-specific screening levels were developed to allow consideration of potential exposure of sensitive ecological populations. Conclusions regarding the potential risks to ecological receptors are presented in the following paragraphs. Mitigation measures are described Section 5.5.

5.4.1 South Sutter Property

Toxaphene was detected in soil on the South Sutter property at a maximum concentration of 0.19 mg/kg. The maximum detected concentration is greater than the project-specific screening levels for exposure of biota to surface and subsurface toxaphene concentrations. However, the site-wide average concentration is well below the project-specific screening levels. Further, the toxaphene is limited to the upper six inches of topsoil.

Dieldrin was detected in one soil sample at a concentration of 0.0061 mg/kg, which slightly exceeds the project-specific screening levels for direct contact of biota with

dieldrin in surface and subsurface soils, and for leaching to groundwater. There is no evidence that dieldrin was inappropriately disposed or applied to the site. Consequently, it is reasonable to assume that the dieldrin was applied as a pesticide. The single detection above the laboratory reporting limit suggests that the average site-wide dieldrin concentration is low. A value of half the reporting limit was used to calculate a mean concentration that is below the project-specific screening levels. Consequently, dieldrin will not be considered further in relation to the South Sutter site.

Before excavation of borrow soil, the topsoil will be stripped and stockpiled for subsequent replacement. The maximum toxaphene concentrations will likely decrease as a natural consequence of the stripping, stockpiling, and re-spreading processes. Consequently, the soil on the South Sutter property is not expected to pose an unacceptable direct contact risk to ecological receptors.

The maximum detected toxaphene concentration is below the project-specific soil leaching screening level. It is unlikely that toxaphene currently poses a threat to groundwater. Although excavation of borrow soil will reduce the grade elevation by approximately two feet, toxaphene is unlikely to pose an unacceptable threat to groundwater after being respread on the site.

Construction activities are not expected to exacerbate current conditions, and as described above, may improve upon current conditions.

5.4.2 Novak Property

Toxaphene was detected in soil on the Novak property at a maximum concentration of 0.22 mg/kg. The maximum detected concentration is greater than the project-specific screening levels for exposure of biota to surface and subsurface toxaphene concentrations. The sitewide average concentration in the upper one foot of topsoil is slightly greater than the project-specific screening levels. If the Novak property will be returned to agricultural use, soil mitigation may be desirable to reduce potential risk to sensitive ecological receptors. If the projected future use of the Novak property is for establishment of native grassland, then site soils are not expected to pose an unacceptable direct contact risk to ecological receptors.

As with the South Sutter property, the maximum detected toxaphene concentration on the Novak property is below the project-specific soil leaching screening level. It is unlikely that toxaphene currently poses a threat to groundwater. Although excavation of borrow soil will reduce the grade elevation by approximately two feet, toxaphene is unlikely to pose an unacceptable threat to groundwater after being re-spread on the site.

Construction activities are not expected to exacerbate current conditions, and as described above, may improve upon current conditions.

5.4.3 Huffstutler Property

Dieldrin was detected in soil on the Huffstutler property at a maximum concentration of 0.10 mg/kg. Dieldrin was detected in the upper six inches of topsoil, but was not detected at a depth of 1.5 feet bgs. Dieldrin concentrations were not measured in soil samples collected at 1 foot bgs. The maximum detected and average concentrations are greater than the project-specific screening levels for direct contact of biota with dieldrin in surface and subsurface soils, and for leaching to groundwater.

Arsenic was detected above background concentrations on the Huffstutler property, with a maximum detected concentration of 43 mg/kg. The maximum detected and average arsenic concentrations exceed the project-specific screening levels for direct contact of biota with arsenic in surface and subsurface soils and for leaching to groundwater. Arsenic concentrations were observed to be consistent to a depth of 1.5 feet bgs. At 2.0 feet bgs, arsenic concentrations were consistent with background concentrations.

The current land use at the Huffstutler property is for agriculture. Because concentrations of dieldrin and arsenic in topsoil exceed project-specific ecological risk screening levels, the current site conditions may pose an ecological risk. This risk may be mitigated by isolating soil with pesticide residues in excess of project-specific screening levels. Alternatively, an ecological risk assessment could be performed to refine the estimated volume of topsoil that may require mitigation. The ecological risk assessment would involve development of more applicable exposure pathway assumptions to better reflect current site conditions and future land use scenarios.

Project-specific screening levels for leaching of dieldrin and arsenic to groundwater were calculated as described in Section 5.3. However, no site-specific soil property data were available to calculate less conservative values. Based on the absence or low concentrations of dieldrin and arsenic at greater depths, it seems unlikely that either dieldrin or arsenic currently poses a threat to groundwater. Pesticide residues that adhere to soil particles may be transported from the site to surface water bodies by erosion and sedimentation. Attempts to quantify the ecological risk posed by erosion and sedimentation under current conditions would be speculative. However, NLIP construction activities will include implementation of runoff controls, so post-construction conditions with respect to erosion and sedimentation are expected to be as good as or better than current conditions.

It is unlikely that either dieldrin or arsenic currently poses an unacceptable ecological risk to neighboring properties. Construction activities are not expected to exacerbate current conditions, and as described above, may improve upon current conditions.

5.5 MITIGATION

Considering the environmental conditions at these properties, the potential effects on ecological receptors from construction of the proposed levee and associated structures would appear to be limited to the following:

- Management of surface soil OCP concentrations at each of the three properties to mitigate short and long-term exposure, to the extent practical, to wildlife and other terrestrial biota.
- Management of soil runoff to surface water at each of the three properties to mitigate short and long-term exposure, to the extent practical, to aquatic biota.

The topsoil at these properties contains manageable levels of pesticide residues that are not required to be reported under Cal EPA regulations. Nevertheless, when topsoil is removed (stripped), it should be wetted prior to working to limit fugitive dust generation and done in a manner that controls erosion and sedimentation, consistent with state and local requirements. Removed topsoil and other soil should be properly stockpiled following typical state and local requirements.

This project is expected to result in conversion of some or all of these properties from an agricultural land use to an ecological land use. Some soils may not be acceptable for use in an ecological land use scenario. Due to the nature of the borrow operations, there will be substantial mixing of soil, which is anticipated to reduce the average concentrations of residual agricultural chemicals and consequently, reduce existing ecological risk that may be associated with residual agricultural chemicals. In addition, soil with higher residual levels can be placed in the berms, if necessary, to further reduce potential ecological exposure. Sediment runoff from the sites, which is the main ecological exposure potential, can be controlled by features such as drainage configuration, re-vegetation, construction of grassland swales, and adjusting soil porosity to eliminate run-off. By reducing both the concentrations and sediment discharge, SAFCA's borrow site activities will reduce potential long-term ecological risk relative to current site conditions.

5.5.1 South Sutter Property

Detected concentrations of pesticide residues in surface soil on the South Sutter property are unlikely to pose unacceptable ecological risks on or off the property. No action appears to be necessary for mitigation of ecological risks related to current conditions, construction activities, or post-construction land use. Construction of runoff controls will improve on current conditions by reducing transport of sediment that may contain pesticide residues.

5.5.2 Novak Property

Detected concentrations of pesticide residues in surface soil on the Novak property are unlikely to pose unacceptable ecological risks on or off the property. No action appears to be necessary for mitigation of ecological risks related to current conditions, construction activities, or post-construction land use. Construction of runoff controls will improve on current conditions by reducing transport of sediment that may contain pesticide residues.

5.5.3 Huffstutler Property

Under the current land use, the detected concentrations of pesticide residues in surface soil on the Huffstutler property are unlikely to pose unacceptable ecological risks off the property. However, the pesticide residue concentrations in topsoil on the Huffstutler property may pose an ecological risk. In lieu of re-spreading stripped topsoil containing pesticide residues in the borrow excavation, the topsoil could be used as borrow to construct portions of the seepage berm. The soils should be placed in the berm so they are no closer than two feet to the berm surface. If soils are to be relocated to the seepage berm, additional sampling and an ecological health risk assessment should be performed to refine the estimated extent and volume of soil that would be relocated.

The pesticide residues in soils on the Huffstutler site are included on the list of characteristically hazardous substances for the characteristic of toxicity. The pesticide residues are present on the property because of historical agricultural practices. There is no evidence that improper disposal or application took place on the property. Consequently, there is no evidence hazardous waste has been disposed on the property. Further, the excavated soil will not be managed on another site, and as a result does not fit the definition of "waste" for the purposes of identification of hazardous waste (DTSC, 2007). Because the soil is not waste, it cannot be classified as hazardous waste unless it is found to contain hazardous waste ("contained-in" policy, DTSC, 2007). Because there is no evidence that hazardous waste has been applied to the property, there is no evidence that the soil contains hazardous waste, regardless of the constituent concentrations.

The fact that the soil is not waste and does not contain hazardous waste notwithstanding, if one were to assume for the sake of argument that the soil is waste, then total pesticide residue concentrations in the soil would first be compared to the applicable total threshold limit concentrations (TTLCs). No pesticide concentrations exceed the respective TTLCs. Consequently, the topsoil from the Huffstutler property is not classified as hazardous by this criterion. In addition to the TTLC, soil sample testing using the waste extraction test (WET) would also be used to identify whether the soil is hazardous waste. Extracts from the WET that contain more than the applicable solubility limit threshold concentration (STLC) would be classified as characteristically hazardous. Because the WET method uses a 10 to 1 dilution factor by weight, it is

physically impossible for a solid sample to be classified as hazardous unless the sample contains more than 10 times the STLC expressed in units of mg/kg. Soil from the Huffstutler property does not contain dieldrin in concentrations that could exceed the STLC. Further, with the exception of one sample collected in 2006, soil from the Huffstutler property does not contain arsenic in concentrations that could exceed the STLC. Accordingly, the Huffstutler soil would not be hazardous waste, even if it were incorrectly classified as waste.

As on the other properties, construction of runoff controls will improve on current conditions by reducing transport of sediment that may contain pesticide residues.

6 LIMITATIONS

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that SAFCA has reviewed the document and determined that it does not need or want a greater level of service than provided.

During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from preexisting hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Nothing contained in this report should be construed or interpreted as requiring Kleinfelder to assume the status of an owner, operator, or generator, or person who arranges for disposal, transport, storage or treatment of hazardous materials within the meaning of any governmental statute, regulation or order. SAFCA is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. SAFCA is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

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Kleinfelder, 2009b. Phase I Environmental Site Assessment Update, South Sutter LLC Property, APN 201-0270-037/Reach 8, 6800 Garden Highway, Sacramento, California. 94582/SAC8R496, July 20, 2009.

Kleinfelder, 2009c. Phase I Environmental Site Assessment, Novak Property, APN 225-0090-040/Reach 12A, 4209 Garden Highway, Sacramento, California. 94582/SAC8R264, January 12, 2009.

Kleinfelder, 2009d. Phase I Environmental Site Assessment, Huffstutler Trust Property, APN 225-0110-019, -020, and -036/Reaches 13&14, 3800 Garden Highway, Sacramento, California. 94582/SAC9R090, April 6, 2009.

Kleinfelder, 2009e. Borrow Site Environmental Sampling, Sampling Analytical Results, Huffstutler Property (APN 225-0110-019, -020, and -036), Sacramento, California. 94582/SAC9R282, May 7, 2009.

Kleinfelder, 2009f. Borrow Site Environmental Sampling, Sampling Analytical Results, South Sutter Property (APN 201-0250-015, 201-0270-002, -037), Sacramento, California. 94582/SAC9R329, May 7, 2009.

Kleinfelder, 2009g. Limited Soil Sampling Analytical Results (Revision), Novak Property (APN 225-0090-040), 4209 garden Highway, Sacramento, California. 94582/SAC9R348, May 15, 2009.

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Office of Environmental Health Hazard Assessment (OEHHA), 2008. Appendix D. Air Toxics Hot Spots Risk Assessment Guidelines, Technical Support Document For the Derivation of Noncancer Reference Exposure Levels. December

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), 2008. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final - November 2007 (Revised May 2008).

USEPA, 2003. USEPA, Region 5, RCRA Ecological Screening Levels August(22, 2003) [based upon exposure to masked shrew {Sorex cinerus}]

USEPA, 2005. Ecological Soil Screening Levels for Arsenic Interim Final OSWER Directive 9285.7-62 (March)

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USEPA, 2009. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update. April 2009. Available on-line at http://www.epa.gov/region09/superfund/prg/index.html

U.S. Geological Survey Professional Paper 1270, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States.

Wallace, Kuhl, & Associates (WKA), 2006. Limited Phase 2 ESA Results, Johnson-Natomas Property, 3800 Garden Highway, Sacramento, California. WKA No. 7120.02, July 13, 2006.

Table 1
Human Health and Ecological Screening Values

	CHHSLs		ESLs			OEHHA: Reference Exposure Levels		USEPA: Region 9 Screening Levels			
Human Health Risk	Res	Com/Ind	Res	Com/Ind	Const Wk	Acute	8-hour	Res	Res-Air	Com/Ind	Ind-Air
Constituent	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	$\mu g/m^3$	$\mu g/m^3$	mg/kg	$\mu g/m^3$	mg/kg	$\mu g/m^3$
Arsenic	0.07	0.24	0.39	1.6	15	0.2	0.015	0.39	0.00057	1.6	0.0029
Dieldrin	0.035	0.13	0.034	0.13	1.6	NA	NA	0.03	0.00053	0.11	0.0027
Toxaphene	0.46	1.8	0.46	1.8	22	NA	NA	0.44	0.0076	1.6	0.038

Notes:
CHHSLs - *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties.* Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento, California. January 2005

ESLs - Environmental Screening Levels (ESLs), *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater,* San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), Interim Final - November 2007 (Revised May 2008) Tables K-1, K-2, K-3 Direct Exposure Screening Levels

OEHHA REL - *OEHHA Air Toxics Hot Spots Risk Assessment Guidelines Technical Support Document for the Derivation of Noncancer Reference Exposure Levels, Appendix D*. December 2008.

USEPA RSL - *USEPA Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites*. RSL Table Update. Available on-line at http://www.epa.gov/region09/superfund/prg/index.html. April 2009.

Background or concentration range - Concentrations observed at agricultural sites considered for potential use as a school site in California. *Interim Guidance for Sampling Agricultural Fields That Are Prioposed for School Sites* (undated), Human and Ecological Risk Division, Department of Toxic Substances Control

Res - Residential Exposure Scenario
Com/Ind - Commercial/Industrial Worker Exposure Scenario
Const Wk - Construction Worker Exposure Scenario
Res-Air/Ind-Air - Residential Scenario Ambient Air, Commercial/Industrial Worker Scenario Ambient Air
mg/kg - milligrams per kilogram, equivalent to parts per million (ppm)
$\mu g/m^3$ - micrograms per cubic meter, equivalent to parts per billion (ppb)

	ESL	USEPA Reg	USEPA Eco-SSL			NOAA SQuiRT				
Ecological Risk	Prot-SW	Soil	Avian	Mammal	Plant	Mammal	Avian	Invertebrates	Plants	Microbes
Constituent	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	NA	5.7	43	46	18	5.7	43	60	18	100
Dieldrin	0.0023	0.0024	0.022	0.0049	NA	0.0024	0.022	NA	NA	NA
Toxaphene	0.00042	0.119	NA	NA	NA	0.119	NA	NA	NA	NA

Notes:
ESL - Default SFBRWQCB ESL soil concentration with a leaching model protective of groundwater discharging to surface water with an aquatic habitat concentration goal (Table G)
USEPA Region V Ecological - USEPA, Region 5, *RCRA Ecological Screening Levels* August 22, 2003) [based upon exposure to masked shrew {Sorex cinerus}]
USEPA Eco-SSL (arsenic) - USEPA, 2005, *Ecological Soil Screening Levels for Arsenic* Interim Final OSWER Directive 9285.7-62 (March)
USEPA Eco-SSL (dieldrin) - USEPA, 2007, *Ecological Soil Screening Levels for Dieldrin* Interim Final OSWER Directive 9285.7-56 (revised April 2007)
NOAA Screening Quick Reference Tables (SQuiRTs), 2008. Soil Screening Levels
mg/kg - milligrams per kilogram, equivalent to parts per million (ppm)

Table 2
Project-specific and route/land use specific screening level

Human Health	Construction Worker	Residential Ambient Air
Constituent	mg/kg	$\mu g/m^3$
Arsenic	15	0.015
Dieldrin	1.6	0.00053
Toxaphene	22	0.0076

Construction Worker values from the SFBRWQCB ESL for construction worker direct contact.

Residential Ambient Air values from USEPA RSLs for ambient air concentrations.

mg/kg - milligrams per kilogram, equivalent to parts per million (ppm)

$\mu g/m^3$ - micrograms per cubic meter, equivalent to parts per billion (ppb)

Ecological Risk	Surface soil	Subsurface Soil	Soil Leaching
	0-1 ft bgs	1-2 ft bgs	All depths
Constituent	mg/kg	mg/kg	mg/kg
Arsenic	11.3	11.3	11.3
Dieldrin	0.0024	0.0024	0.0033
Toxaphene	0.119	0.119	93

Surface Soil: Values for dieldrin and toxaphene are the minimum values from sources listed in Table 1. Arsenic value is the California DTSC background value for agricultural sites.

Subsurface Soil: Values are ecological risk for mammals only.

Soil Leaching - All Depths: Values for dieldrin and toxaphene calculated using the ESL soil leaching model and Koc values from the USEPA RSL chemical constants table. Value for arsenic is background concentration.

mg/kg - milligrams per kilogram, equivalent to parts per million (ppm)

Table 3
Calculation of Fenceline Particulate NOS Goals for Protection of Off-Site Residents During Earthmoving

Assumptions:

The source of dust making up the Particulate NOS is soil containing the maximum detected concentration of pesticide residues
Short-duration exposure limits are represented by the California Air Resources Board Reference Exposure Levels (RELs)
Acute RELs represent a maximum air concentration averaged over one hour and may be repeated.
8-Hour RELs represent a maximum air concentration averaged over eight hours and may be repeated.
In the absence of an REL, use the more conservative long-duration exposure limit
Long-duration exposure limits are represented by the US EPA Regional Screening Levels for Ambient Air

Residential Ambient Air Screening Levels			
Pesticide Residue	**Acute (1-hr) REL**	**8-Hour REL**	**Ambient Air RSL**
	µg/m^3	**µg/m^3**	**µg/m^3**
Arsenic	0.2	0.015	--
Dieldrin	NA	NA	0.00053
Toxaphene	NA	NA	0.0076

Notes:
NA, Not Available
--, REL available therefore RSL not necessary
RELs from Office of Environmental Health Hazard Assessment (OEHHA),
2008. Appendix D. Air Toxics Hot Spots Risk Assessment Guidelines,
RSLs from USEPA Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update. Available on-line at http://www.epa.gov/region09/superfund/prg/index.html. April 2009.

Table 3 (continued)
Calculation of Fenceline Particulate NOS Goals for Protection of Off-Site Residents During Earthmoving

The Fenceline Particulate NOS goal is calculated by the following equation:

Fenceline Particulate NOS (mg/m^3) = REL or RSL ($\mu g/m^3$) / 1,000 (µg/mg) /Analyte Concentration (mg/kg) x 1,000,000 (mg/kg)

where:

REL or RSL = Acute REL or 8-Hour REL or RSL

1,000,000 mg/kg = Units conversion factor

Analyte Concentration mg/kg = Maximum detected soil concentration of pesticide residue

1,000 µg/mg = Units conversion factor

Calculated Fenceline Particulate NOS Goal to Protect Off-Site Residents			
Pesticide Residue	Maximum Detected Soil Concentration	Acute (1-hr) Particulate NOS Goal	8-Hour Particulate NOS Goal
	mg/kg	mg/m^3	mg/m^3
Arsenic	43	4.7	0.35
Dieldrin	0.10	5.3	5.3
Toxaphene	0.22	35	35

The selected Acute (1-Hour) Fenceline Particulate NOS goal is the lowest value for the pesticide residues, rounded down to 4.5 mg/m^3

The seelcted 8-Hour Fenceline Particulate NOS goal is the lowest value for the pesticide residues, rounded down to 0.3 mg/m^3

Appendix A

Resumes

JOHN BAKER
Northern California Division Manager

Summary of Experience

Mr. Baker has over 37 years experience in the engineering and construction industry, including civil and environmental engineering work on public infrastructure, commercial and publicly-owned buildings and facilities, and contaminated real estate. He has developed strong management and leadership skills through his association with his public and private clients, as well as through the many professional association affiliations he maintains. Mr. Baker has also developed strong relationships with the many regulatory agencies involved in his projects.

Education

MS, Civil Engineering, University of California, Berkeley, California, 1973
BS, Civil Engineering, University of California, Berkeley, California, 1968

Registrations

Professional (P.E.) - Civil, No.23727, CA, 1974
Professional (P.E.) - Civil, No.13717, OR, 1991

Professional Affiliations

Consulting Engineers and Land Surveyors of California, Past President
California Geotechnical Engineers Association, Past President
American Consulting Engineering Council, Past California Delegate and Public Relations Chair
National Groundwater Association
Groundwater Resources Association
American Society of Civil Engineers, Chair, GeoInstitute Professional Practices Council
Engineering Alumni Society, UC Berkeley, Past President

Project Experience

The following is a representative selection of John Baker's project experience.

General

Soil and Groundwater Remediation, State of California Superfund Site, Bulk Fuel Facility, Sacramento County, California.
This site involved fuel and solvent contaminated soil and groundwater resulting from an arson caused fire. A soil and multi - layer groundwater characterization was followed by soil remediation, groundwater monitoring, and eventual case closure by the State of California.

Environmental Site Assessment, Rail Yard, State of California Superfund Site, Sacramento, California .
This historic site had been impacted by over a century of fuel, solvent, and industrial

waste. The assessment involved advising a prospective purchaser on the extent of contamination and the risks involved in obtaining the property for commercial development.

DDT Contaminated Residential Building Site, El Dorado County, California.
This former pear orchard was proposed for residential development. DDT contaminated soil was discovered during the initial property evaluation. With the approval of the local and state regulatory agencies, the impacted soil was used as deep fill during site grading, allowing the project to go ahead.

Soil and Groundwater Characterization/Recalcitrant and Abandoned Site, Yuba County, California.
The owner of this site abandoned the property, leaving significant soil contamination and groundwater impacts that contaminated neighboring drinking water wells. Funded by the State of California's Abandoned and Recalcitrant Owners fund, the site was characterized for soil and groundwater impacts. A combination air sparging and vapor extraction system was designed for site remediation.

Mercury Contaminated Soil Cleanup, Publicly Owned Treatment Facility, Nevada County.
Free mercury discovered during a remodeling of this sewage treatment facility had been deposited from a neighboring gold mine. The site was characterized and the impacted soil encapsulated onsite, through the State's Voluntary Cleanup Program.

Chlorinated Solvent Groundwater Cleanup, Circuit Board Manufacturing Facility, Placer County, California.
This groundwater at this site was impacted by chlorinated solvents resulting from circuit board fabrication and a former airplane maintenance yard. The shallow groundwater, flowing on top of fractured bedrock, was characterized, and a remediation system, including multiple extraction wells and an infiltration trench to accelerate the cleanup was installed.

Environmental Site Assessment, Former Ship Building Facility, Yolo County, California.
This site, once a barge and ship building facility along the Sacramento River, was scheduled for commercial and residential development. The site was characterized for soil and groundwater impacts, and the limited impacts from heavy metals and fuels were remediated prior to commencement of development.

Soil and Groundwater Characterization, Aggregate Quarry, Alameda County, California.
The project proponent, in acquiring the property and works of an existing aggregate quarry, wished to establish a baseline set of environmental conditions prior to closing the sale. The work included soil and groundwater characterization studies near the equipment maintenance area, the asphalt hot plant, and other select areas.

Asbestos and Lead Based Paint Investigation, Mare Island Naval Shipyard, California.
Prior to purchasing abandoned military base housing for conversion to housing for sale on the real estate market, the client asked for an environmental assessment of the property's condition. The work included a full Phase I assessment of the property, including lead based paint and asbestos determinations.

Groundwater Characterization, Former Container Terminal, Alameda County, California.
An environmental assessment of a former shipping terminal, which included containerized shipping facilities, detected chlorinated solvent impacts to the shallow groundwater and potentially the neighboring estuary. The assessment included evaluation past remedial work and recommending additional cleanup to render the property clean and purchasable.

Environmental Site Assessment, Proposed East Shore Regional Park, Alameda County, California.
The State of California proposed to purchase approximately 500 acres of waterfront property along the East Shore Freeway in Alameda County. The property consisted primarily of bay shore fill, including construction debris, dredge tailings, and domestic waste. The evaluation consisted of constructing an historical record of those areas fill, what the fill material consisted of, and devising a sampling program to protect the State from CERCLA liability.

Construction Management and Testing Services, Pavement Overall Project, Nevada County .
A major public road improvement project, including localized widening, overlays, and chip seals was conducted by the county. The work included making design recommendations for the various phases of the project, conducted daily construction phase recommendations, and administering the construction contract.

Soil and Groundwater Investigation and Landfill Closure, Sacramento County, California.
An historic landfill utilized between 1880 and 1920 for construction and municipal waste from downtown area of Sacramento was the proposed site of a new fire station. The work included evaluating the hazardous materials and groundwater risks from the landfill. A soil and groundwater characterization, followed by a limited groundwater risk assessment allowed the California Integrated Waste Management Board and the Regional Water Quality Control Board to "close" the site requiring no further action.

Soil Contamination Characterization and Remediation, Correctional Facility, Toloumne County, California.
The correctional facility leased a portion of its site to the Department of Forestry's fire training center. Diesel fuel, used frequently to fuel fire fighting exercises, had severely contaminated the soil around the center. The contamination was characterized, removed, and biologically remediated on site before being returned to its original location.

Soil and Groundwater Investigation and Remediation, Public Right of Way, Placer County, California.
During construction of a new waterline and street improvement project, gasoline and diesel fuel soil contamination was discovered in the public right of way. The project involved characterizing the extent of soil and shallow groundwater contamination, identifying its source, remediating the soil contamination, revising the installation standards for the water line, and overseeing its installation.

Environmental Site Assessment, Proposed 18,000 acre Residential/Commercial Development, Yolo County, California.
An 18,000 acre agricultural property in Yolo County was proposed for residential and commercial development. The project consisted of an initial environmental assessment of the property, including assessment of past remediation practices at two of the site's agricultural corporation yards.

Dams and Levees

Natomas Basin Levee Evaluation, Sacramento Area Flood Control Agency (SAFCA), Sacramento, California. - From 2008 To 2010
Principal in charge for the analyses and mitigation of the Natomas Levee Improvement Program for Sacramento Area Flood Control Agency (SAFCA). This includes assessing 42 miles of levees for slope stability, under and through seepage, liquefaction, lateral spreading, pseudo-static slope stability, and seismic deformation due to a 200-year design seismic event. The project involves performing the analyses, assessing the impact of FEMA mandated flood levels, plus seismically-induced deformations on the integrity of the levee system, and providing possible mitigation measures.

Publications and Papers

Co-author, *Residual DDT in Agricultural Soil* , National Groundwater Association Annual Conference , Baker and Marshall, Dublin, Ohio, 1991.

Co-author, *Preliminary Endangerment Assessment Manual Soil Screening Evaluation* , Groundwater Resources Association of California , Baker and Vassallo, Sacramento, California, 1995.

KALEN BJURSTROM
Environmental Scientist

Summary of Experience

Mr. Bjurstrom has over five years of increasingly responsible technical project and fieldwork experience. Mr. Bjurstrom has conducted fieldwork, evaluated and interpreted data and prepared numerous scientific and regulatory reports including preparation of Phase I and II Environmental Site Assessments, Air Monitoring reports, Groundwater Monitoring Reports and Environmental Health and Safety Plans. His fieldwork experience includes vast knowledge of groundwater sampling using dedicated and non-dedicated pump systems, including the use of low-flow/ micro purge techniques. Mr. Bjurstrom's sampling experience also includes soil sampling using various methods and air monitoring/sampling using a variety of pumps and meteorological equipment. Mr. Bjurstrom is health and safety trained in accordance with 29 CFR 1910.120 and has served as lead Environmental Health and Safety Officer on a number of projects involving the presence of hazardous materials.

Education

California State University, Sacramento, California,

Certifications

OSHA 40-Hour HAZWOPER, 2004
Nuclear Gauge/Troxler,

Project Experience

The following is a representative selection of Kalen Bjurstrom's project experience.

Environmental Work

Lead Health and Safety Officer for DTSC Remediation project at World Radiator in Paradise, CA. - 2007
Responsible for the implementation and oversight of health and safety plan designed specifically for site and approved by DTSC. Performed all air monitoring, soil confirmation sampling, and MET monitoring to ensure worker and residential safety for duration of project. Acted as onsite lead person in lieu of DTSC during project. Responsible for the oversight and direction of remediation contractor and reporting progress to DTSC.

Lead Environmental Health and Safety Officer, Super Wal-Mart, West Sacramento, California. - 2006
Responsible for the oversight and implementation of site specific health and safety plan designed for the construction process of a new Wal-Mart facility in West Sacramento. Worked with a variety of contractors and sub-contractors for the duration of the project to ensure proper enforcement of the HASP. Also responsible for the monitoring and use of engineering controls to help mitigate fugitive dust and trackout from the site boundaries.

Phase II ESA Sampling, Various Clients, California.
Phase II, Environmental Site Assessment, Various Confidential Clients. Phase II assessments primarily resulted from findings associated with Phase I ESAs completed. Projects involving collection of soil, well and surface water samples for laboratory analyses, hazardous waste disposal, additional historical or regulatory agency record review, land surveys, and geophysical investigations. Sites assessed included former auto repair shops, landfills, industrial facilities, commercial facilities and commercial properties.

Phase I ESA's, Various Clients, California.
Phase I, Environmental Site Assessments (ESA), Various Confidential Clients. Phase I ESAs were conducted according to ASTM standards and client specific standards, for a broad range of clients including banks, REITs and other financial institutions, real estate developers, attorneys, industry and commercial business. Environmental conditions likely to affect the sites were evaluated. The sizes of the sites range from less than one acre to several hundred acre parcels. Phase Is have been conducted for retail development, subdivision development and agricultural properties. Tasks included review of regulatory agency files; historical information including chain-of-title, aerial photo analysis, and Sanborn Map review; and geological and hydro geological characterizations for surrounding areas. A site reconnaissance was conducted to evaluate current site conditions, and "Key Site Managers" were interviewed about current and historical property use.

Ground Water Sampling for Various Clients, California. - From 08/19/04 To 07/19/05
Conducted ground water sampling and monitoring at sites that formerly contained industrial type contaminants, such as designated Superfund sites (CERCLA), dry cleaners, print/screen shops and optical lenses production.

Bulk Pesticide Facility Sampling, Western Farm Service. - From 08/19/04 To 07/19/05
Ground Water Sampling for Western Farm Service, Inc. Conducted ground water sampling at large bulk pesticide facilities requiring special decontamination procedures, personal protective equipment, specialized sampling equipment and safety precautions

Aerojet (Gencorp) Environmental Sampling, Sacramento County, California. - From 07/19/05 To 01/03/08
Responsible for ground water sampling in association with the Aerojet facility and surrounding properties. Conducted many large scale sampling projects and speciality sampling projects in association with Aerojet personnel.

DTSC - Victor, 20th Street, Chico, California
Oversaw the installation and implementation of permeable diffusion bags (PDBs) and harness systems in over 50 groundwater monitoring wells in conjunction with DTSC staff.

DeWitt Center Landfill Investigation, Placer County, California. - 2007
Conducted investigation/cleanup of unauthorized landfill in Placer County. This involved soil sampling, test pits and mapping of contaminants found onsite. Implemented erosion control measures and involved in cleanup activities associated with dumping found on property.

Sacramento County Wastewater Treatment Plant, Sacramento County, California. - From 12/01/07 to 01/03/08
Conducted the weekly neutron soil moisture readings in association with former sludge yards at waste water treatment plant. This included the field monitoring and data management.

DAVID DICKEY
Human Health Risk Assessor

Summary of Experience

David has over 15 years of experience bringing sites into compliance with environmental regulations through technical and management processes, most recently in the field of vapor intrusion risk assessment. His experience includes: Chemical toxicology, Scientific support to the US Coast Guard in spill response; State environmental regulator enforcing regulations and negotiating compliance criteria, assessing potential Superfund sites and developing risk assessment regulations; and, Environmental consultant performing site investigations, risk assessments, and negotiations with regulators.

He conducts vapor intrusion evaluations (Johnson and Ettinger modeling) and human health risk assessments (HHRAs), sampling and analysis planning and execution, technical report writing, and integration of analytical results into strategic planning.

Education

MS, Environmental Science, Louisiana State University, Alexandria, Louisiana, 1994
BS, Microbiology, Louisiana State University, Alexandria, Louisiana, 1991

Project Experience

The following is a representative selection of David Dickey's project experience.

Human Health Risk Assessor

Industrial Facility; Bay City, Michigan - From 2005 To 2007
Mr. Dickey developed human health risk evaluations for a variety of sites at a third-party occupied industrial facility. Risk scenarios included unique recreational users and site-specific industrial worker scenarios. Constituents of concern (COCs) included heavy metals, polychlorinated biphenyls (PCBs), and dioxins/furans. The necessity for human health risk evaluations was determined late in the EI submittal process. However, Mr. Dickey completed the multiple risk evaluation tasks quickly, comprehensively, and efficiently, allowing submittal of the EI report on time. While the EI was still under review by the regulatory agency, the state determined it was satisfied with the risk evaluations and no excess risk was present.

Third-Party Review of HHRA; High-visibility Site, Pacoima, California - 2008

In support of client Due Diligence process, Mr. Dickey conducted a third party peer review of an HHRA report submitted to and approved by the state of California. Mr. Dickey identified several significant issues in the HHRA report that indicated potential future liability for a potential landowner. These included deficiencies in the scope of the risk evaluation, conduct of the risk evaluation, and especially, indications of errors in the regulatory review and approval of the submittal. Detailed reporting of these findings

enabled the client to address the issues with the landowner and better evaluate other landowner documents for regulatory agency procedural issues that may create a "re-opener".

Scenario-specific PCB concentration limits - 2008
Mr. Dickey developed risk-based concentration limits for construction workers potentially encountering polychlorinated biphenyls (PCBs) in utility trenches at a redeveloped air force base property under residential development.

Third-Party Review of HHRA, Carson, California - 2008
Reviewed and evaluated comprehensiveness of third party drafted HHRA for a former mixed-waste landfill. Particular issues identified were: incomplete vapor intrusion evaluation related to adjacent elementary school; more appropriate guidance availability for landfill gas emissions; incomplete evaluation of potential conduits to surface water and an important drinking water aquifer.

Fish consumption screening values, Los Angeles, CA - 2008
Identified applicable USEPA, FDA, and California regulations and developed fish fillet screening concentrations for a large table of potential constituents of concern. Screening values are to be used as minimum reporting limits for laboratory analysis. Identified typical fish species concentrations for monomethyl mercury and potential impact on evaluation of statistical data.

State Environmental Compliance and Risk Assessment

Louisiana Regulatory Compliance and Risk Assessment (RECAP) - From 1994 To 2005
Five years as La Environmental Regulator with personal contacts within the La Dept of Environmental Quality (LDEQ). Experienced with Solid Waste regulations, Superfund Preliminary Assessment/Site Investigation for the HRS, and team member of the committee that developed LDEQ's risk assessment regulations: Risk Evaluation/Corrective Action Program (RECAP). Subsequently was a consultant specializing in Louisiana compliance and closing sites under the RECAP regulations. Particular experience with the interplay of each division's regulations in relation to the RECAP regulations.

Texas Regulatory Compliance and Risk Assessment (TRRP) - From 2002 To 2005
At an active chemical plant in Beaumont, TX, Mr. Dickey planned and conducted site assessments and evaluation of potential risk under Texas' Risk Reduction Program (TRRP) for compliance with a site-wide RI/FS.

Michigan Regulatory Compliance and Risk Assessment - From 2005 To 2007
Mr. Dickey conducted human health risk evaluations for an industrial facility in Michigan impacted with heavy metals, polychlorinated biphenyls (PCBs), and dioxin/furans. Risk evaluations were conducted using the Michigan risk assessment regulations and included use of the Michigan on-line statistical analysis software.

New Jersey Regulatory Compliance and Risk Assessment - From 2005 To 2007
Under the regulations of the New Jersey Department of Environmental Protection (NJDEP), Mr. Dickey evaluated human health risk and vapor intrusion at a Superfund Site. Mr. Dickey also developed site-specific vapor intrusion screening values for a large table of constituents by adapting the NJDEP Johnson & Ettinger model to site-specific conditions.

Ohio Voluntary Action Program (VAP) and Risk Assessment - From 2005 To 2007
In coordination with a Certified Environmental Professional, Mr. Dickey has overseen the Phase II section of an NFA submittal for a plastics manufacturing facility and was the technical lead for the vapor intrusion portion of a site impacted with chlorinated solvents.

KURT FRANTZEN

Eastern Division Leader--Risk Analysis & Toxicology Practice

Summary of Experience

Through risk-based approaches that limit remedial cost, Dr. Frantzen serves clients by interfacing science, engineering, and planning to resolve complex property contamination matters. With extensive risk assessment experience and with large investigation/remediation project management experience, he is a hands-on practitioner achieving high equity results for his clients. A biochemist by training, he has more than 20 years of experience in environmental risk analysis, hazardous waste site/Brownfields investigation/remediation, environmental R&D, and cost accountable management. He has worked on state-led, Superfund, DOE, and DOD sites around the US.

Education

MS, Plant Pathology, Kansas State University, Kansas, 1980
BS, Biology, University of Nebraska, Omaha, Nebraska, 1978
PhD, Life Sciences/Biochemistry, University of Nebraska System : Lincoln, 1985

Registrations

Certified Hazardous Materials Manager (C.H.M.M.), No.14143, IHMM, NAT,
Certified Hazardous Materials Manager (C.H.M.M.), No.14143, 2007

Certifications

OSHA 40-Hour HAZWOPER,

Professional Affiliations

Board of Directors, Western New York Forum on Conflict and Consensus, Inc., FY 1996 .
American Chemical Society, Member since 1985 .
American Institute of Biological Sciences, Member since 1992 .
Society for Risk Analysis, Member since 1994 .

Project Experience

The following is a representative selection of Kurt Frantzen's project experience.

Litigation Support

Risk Appraisal of Retail Fuel Oil Business Property under Probate Medway, MA, 2004
Prepared an appraisal of environmental concerns regarding a commercial business property involving heating oil business to help resolve the properties real estate value.

Exposure, Risk, and Cleanup Goal Basis, New York, NY, 2003
Contributed to defense case (property owner) of PRPs involved in litigation associated with the 9/11 WTC disaster

Asbestos Exposure Reconstruction, New York, NY, 2003
Prepared as part of litigation concerning a NJ/NYC transit worker exposure case; for the defense

Human Health Risks from Dioxin and Other Chemical Emissions From Operation of the Tooele Chemical Agent Disposal Facility, 1996
Litigation support for US Army Litigation Center against restraining order preventing conduct of test burns (see US District Court/Utah Central Division Civil #2:96-CV-425C), Project Director.

Toxic Tort Litigation Associated with the Midway-Bayshore Site, 1995
Responsible for the risk assessment used to evaluate risks from MGP residues (1993), and supported expert preparation for PG&E's defense case.

Exposure, Risk, and Cleanup Goal Basis, New York, NY, 2003
Contributed to defense case of PRPs involved in litigation associated with the 9/11 World Trade Center disaster

Human Health Risks from Dioxin and Other Chemical Emissions Due to Hazardous Waste Incineration, 1996
Litigation support for defendant. Project Director and technical contributor

Risk Assessment & Characterization

Ecological Risk Assessment for the Hinkley Site, 1988
Compressor station in Mojave Desert with hexavalent chromium spill to groundwater - the Erin Brockovich - Evaluated fate and transport, the baseline ecological risks and risks associated with remedial alternatives. Concept creator of the implemented remedial alternative that involved pumping and treatment by natural attenuation. Prepared for Pacific Gas and Electric Co. Served as Task Manager and lead ecotoxicologist.

Superfund Ecological Risk Assessment - Peter Cooper/Markhams Sites, Town of Dayton, NY, 2005
Prepared screening-level ecological risk assessment of upland and wetland resources at a large landfill with hide/glue manufacturing wastes from the former Peter Cooper operation in Gowanda, NY, which contained chromium, arsenic, zinc, and various organic solvents. Benchmark EE&S, PLLC

Risk Appraisal of Retail Fuel Oil Business Property under Probate, Medway, MA, 2004
Prepared an appraisal of environmental concerns regarding a commercial business property involving heating oil business to help resolve the properties real estate value. Confidential Client.

Risk Characterization of Two Properties Located at a Former Coking Operation, Everett, MA, 2002-2004
Prepared Massachusetts Contingency Plan (MCP) Imminent Hazard Evaluation, and

Method 3 risk characterizations for two related properties located atop a former coking operation, addressing human, ecological, public welfare, and safety concerns. Confidential Client. Task Manager.

Risk Appraisal of Large Land Tract for Development, Virginia Beach, VA, 2002-2003
Purpose was to appraise the environmental liabilities associated with 400-acre undeveloped tract near a mixed residential and university setting in preparation of development, which has been in use for >100-years, as part of an overall real estate feasibility study. Included a Phase I ESA update for the entire property and risk profiling and liability estimation for the specific 50-acre site slated for initial development. CBN. Task Manager.

Risk Appraisal of a Transit Depot/Garaging Facility, Richmond, VA, 2002
Purpose was to appraise the environmental liabilities associated with 6-acre transit facility in a highly urban area, which has been in use for >100-years, as part of an overall real estate feasibility study. Includes Phase I ESA, risk profiling, and liability estimation. Greater Richmond Transit Company. Task Manager.

Risk Appraisal Transactional Due Diligence Support of a Chlorinated Solvent Contaminated Property, Stamford, CT. 2001
Prepared appraisal of the environmental risk issues associated with a property transaction involving a contaminated commercial property. Followed the Risk Appraisal approach developed by K. Frantzen (see Books and Articles section below). Confidential Client. Project Manager.

Method 3 Risk Characterizations of the Chelsea River Fuel Oil Spill, Boston, MA. 2000 - 2002
Supported the establishment of Data Quality Objectives, design of environmental investigations, and development of a risk characterization program to support closing the spill response activity. This work helped PRP avoid Natural Resource Damages issues. Work performed for Clean Harbors. Project Manager.

Update of Method 3 Risk Characterization, Lawn Street Disposal Site, Attleboro, MA. 1999.
Prepared an update to the Massachusetts Contingency Plan (MCP) Method 3 Risk Characterization prepared previously. For Eastern Utilities / Blackstone Valley Electric Corp. through their consultant GEI Consulting, Inc., Project Manager.

Baseline Risk Assessment for Former MGP Site, Plattsburgh, NY. 1998
Prepared a baseline human health and ecological risk assessment for the upland portion of this former manufactured gas plant site situated within an urban area and along the Saranac River, an important trout fishery. The work included development of remedial objectives and target cleanup levels. For NYSEG, Task Manager and lead author.

Risk Evaluation of Two Small Former MGP Sites, 1998
Evaluated potential risks associated with remaining soil and groundwater contamination at two small urban sites in southeastern New York. Prepared for Orange and Rockland Utilities Co. Task manager and author.

Method 3 Risk Characterization for a Former Manufactured Gas Plant Site, Southbridge, MA, 1998.
Completed a Massachusetts Contingency Plan (MCP) Method 3 Risk Characterization to support a Phase II investigation at a former MGP site currently used as a utility service center. For Mass. Electric Corp., Task Manager.

Method 3 Risk Characterizations for the Mendon Road and Lawn Street Disposal Sites in Attleboro, MA. 1998.
Completed two Massachusetts Contingency Plan (MCP) Method 3 Risk Characterizations. These documents supported the Phase I and Phase II investigations at former sand quarries that were used as disposal sites for oxide box purifier wastes from the former Tidewater MGP in Pawtucket, RI. Supported risk communication efforts including the preparation of fact sheets and presentations at public information meetings. For Eastern Utilities / Blackstone Valley Electric Corp., Task Manager and lead author.

Method 2 Risk Characterization for Franklin Manufacturing Facility, MA, 1998.
Evaluated risks associated with the accumulation of volatile organics within a facility overlying contaminated soils and groundwater to support a No Further Action (NFA) decision. Prepared for Franklin Manufacturing Co. Risk Assessor.

Remedial Investigation and Risk Assessment for Environmentally Impaired Property, 1998
Managed the remedial investigation and baseline human health and ecological risk assessment of the former manufactured gas plant site in the Clifton area of Staten Island. Development of remedial objectives and target cleanup levels, and risk communication support will be included. For KeySpan Energy. Project Manager, lead author, and risk assessor.

Development of Cleanup Goals and Risk Characterization to Support Response Action Outcome, Boston, MA, 1998
A drum burial area was discovered and response actions commenced at a former PVC manufacturing location. Drums contained various organic chemicals, most containing aldehydes and ketones, and which are not common environmental contaminants. Quickly
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Method 3 Risk Characterization of Indoor Air at the Lynnwood Facility, Lynn, MA, 1998
Evaluated risks associated with the accumulation of volatile organics within a facility overlying contaminated soils and groundwater to support a No Further Action (NFA) decision. Prepared for Emlicon Corp. Task manager and author.

Risk Characterization at a Manufacturing Complex, Boston, MA, 1997-1988
Project dealt with risks associated with the accumulation of volatile solvents within buildings within the complex, and construction workers' exposure. Solvents (TCE) used in the manufacturing processes were released into soils underneath certain buildings resulting in a large plume. Designed an indoor air evaluation program. Risk assessment performed according to Massachusetts Contingency Plan (MCP) Method 3 Risk Characterization protocol. Prepared for confidential client. Task manager and author.

Risk Characterization of the Western Ave. Site, Brighton, MA. 1997
Completed a Massachusetts Contingency Plan (MCP) Method 3 Risk Characterization to support the filing of a Response Action Outcome (RAO) for an underground storage tank removal. It also justified not achieving a background concentration for various polycyclic aromatic hydrocarbons and other petroleum hydrocarbons. Prepared for the Massachusetts Turnpike Authority. Task manager and author.

Risk Assessment for the Former Manufactured Gas Plant Site, Cambridge, MD, 1997
prepared a site-specific analysis of risk associated with MGP-related chemicals in surface soil. The assessment was prepared to guide decision-making regarding future use and need for mitigative actions. Prepared for confidential client. Task manager and author.

Bioaccumulation of PAHs into Garden Produce and Associated Health Risks, 1997
Literature review and geochemical analysis of distribution of PAHs in soils, and exposure and associated health risk to gardeners and consumers of garden produce grown in PAH contaminated soils. Prepared for a confidential client. Project Manager and lead author.

Screening-level Ecological Risk Assessment for the Chevron Cincinnati Refinery, 1996
Multimedia analysis of potential risks to ecological resources. Prepared for Chevron Research and Technical Co. Served as Project Director.

Assessment of Risks to the Ecology, Public Health, and Cultural Resources at the DDT Contamination Site, Bandelier National Monument, New Mexico, 1996
Multimedia analysis of potential risk posed by pesticides to various receptors. Demonstrated no action alternative viable. Supported regulatory negotiations. Prepared for National Park Service. Served as Project Director and lead author.

Human Health Risk Assessment for the Tar Creek Superfund Site, Ottawa County, Oklahoma, 1995
An assessment of residential exposures to lead and other metals in the soils in and around homes located near former Picher Mine in the Tri-State Mining District. Part of remedial investigation. Prepared for U.S. EPA Region VI. Served as Task Manager.

Public Health and Ecological Risk Assessment, 1994
Part of a series of reports for a comprehensive investigation of a former manufactured gas plant site for Brooklyn Union Gas Co. Served as lead author and Program Manager.

Risk Assessment for Underground Storage Tank #317 at Building 5110, Fort Wainwright, Alaska, 1993
An alternate contaminant level determination and risk assessment for the U.S. Army Corps of Engineers, Alaska District. ACL accepted by AK-DEC and implemented. Served as Project Manager.

Risk Assessment Guidance, 1993
Developed a six part series of guidance documents for use by various contractors at the U.S. Department of Energy Idaho National Engineering Laboratory (INEL). Served as technical coordinator and principal author.

Public Health and Environmental Evaluation of the Midway-Bayshore Site, 1993
Prepared the risk assessment used to evaluate risks from MGP residues in a residential area in Daly City, CA (San Francisco area) and prepared cleanup goals for closure negotiations with CAL-EPA. For PG&E. Served as lead author.

Public Health and Ecological Risk Assessment for the H & H Burn Pits Site, 1993
Prepared as part of a Remedial Investigation of a National Priorities List site for the U.S. EPA Region 3. Served as Principal Toxicologist.

Environmental Cost/Benefit Assessments, 1993
Cost/benefit analysis of remedial action alternatives for four DEW Line Sites along north coast of Alaska for the U.S. Army Corps of Engineers, Alaska District. Served as project risk assessor.

Public Health and Ecological Risk Assessment for the Cleveland Mill Mine Site, 1993
Part of a Remedial Investigation of a National Priorities List site conducted for the New Mexico State Environment Department. Served as Principal Toxicologist.

Public Health and Ecological Risk Assessment, 1993
Part of a series of reports for a comprehensive investigation and remediation of a former manufactured gas plant site in San Francisco. Developed supporting scientific document for cleanup goal negotiations. Prepared for Pacific Gas and Electric. Served as Principal Toxicologist.

Toxicity Reference Values for Ecological Assessment, 1992
Developed innovative approach of deriving reference doses/concentrations of environmental toxicants for Rocky Mountain Arsenal Ecological Risk Assessment.

Comparison of Environmental Effects of Land-based Re-Use and Ocean Disposal of Municipal Sewage Sludge, 1992
For the New York City Department of Environmental Protection, Land-Based Sludge Management Project. Served as upland resource risk assessor.

Remedial Action Plan and Ecological Risk Assessment for the P&S Yard, Swanson River Field, 1990

For ARCO-Alaska, Project involved a xylene spill in an oil field on the Kenai Peninsula. Served as ecotoxicologist and primary author.

Hazard Analysis for the Proposed Dining Hall at Eielson AFB, Fairbanks, Alaska, 1989
Prepared for the U.S. Army Corps of Engineers-Alaska District. Analyzed hazards associated with building on and in petroleum-contaminated soil and developed a conceptual approach for engineering a protective barrier to allow construction without removal of contaminated soils. Served as Project Manager.

Preliminary Endangerment Assessment for the Birnbaum Scrapyard Site in Hankinson, North Dakota, 1989
Prepared for U.S. EPA Region 8. Principal author.

Preliminary Endangerment Assessment for the Yttrium Processing Plant in Laramie, Wyoming, 1989
Prepared for U.S. EPA Region 8. Principal author.

Risk Assessment for the Madison Wire/Orban Industries Site Remedial Investigation, 1989
Prepared for the New York State Department of Environmental Conservation. Served as Task Manager and lead toxicologist.

Risk Assessment for the Proposed North Post Family Housing Facilities at Fort Wainwright, Fairbanks, Alaska, 1988
Prepared for the U.S. Army Corps of Engineers-Alaska District. Served as Project Manager and lead author.

Human Health Risks Associated with Cooling Tower Emissions, 1987
Prepared for Ocean States Public Power as part of an Environmental Assessment, evaluated potential human health risks from both heavy metals and Legionella in tower drift. A member of the risk assessment team.

Environmental Risk Management

Environmental Risk Management Support and Program Consultant 1997-2004
Key consultant for a program involving a large portfolio of former Manufactured Gas Plant (MGP) sites and ancillary properties for an energy company in the eastern U.S. (100 in all). The scope of work included coordinating site reconnaissance, quality assurance of work plans, participating in developing strategic and tactical approaches to regulatory issues and negotiations, preparing individual property risk appraisals and portfolio threat analysis (comparative risk ranking), quality assurance of remedial investigations, and service as technical spokesperson in public forums. Managed teams performing investigation and remediation of sites, and led the team preparing all exposure and risk assessments and establishing cleanup goals. KeySpan Energy

Environmental Manager for Nott Street Industrial Park, Schenectady, NY, 2001-present
Serve as environmental consultant overseeing and monitoring conditions at the Park, which is under a Stipulation and a VCA from the NYSDEC. Interact with counsel, agency personnel, and tenets (including GE Power Systems) to assure compliance and direct work to achieve closure of extant environmental orders. Schenectady Industrial Corporation. Project Manager.

Environmental Risk Management Support to Evaluate Conditions at a Factory Daycare Center, Upstate, NY. 2001
Providing technical (toxicology and exposure analysis) support during the evaluation of environmental reports of the facility. Also supporting the risk communication program within the company, the center, regulatory agencies, and the media. Confidential Client. Project Manager

Environmental Risk Management Support to Real Estate Developers of Former Apple Orchards, Marlborough, MA. 2000-2001
Providing technical (toxicology and exposure analysis) support during the evaluation of environmental reports of several large parcels former part of a large apple orchard. Public concern expressed over lead arsenate and chlorinated pesticides in soils and their disturbance during development. Also, supported risk communication program at public hearings. MetLife, Avalon, and Gutierrez Companies.

Environmental Risk Management Due Diligence Review of a Mercury Contaminated Building Planned for Redevelopment as Office Space, Danvers, MA. 2000 - 2001
Worked as senior environmental reviewer and consultant to guide Phase I and II ESA activities of the former OSRAM Sylvania Manufacturing Facility. Worked for Redeveloper. Project Manager and Risk Analyst.

Environmental Risk Management Support of a Redevelopment of a Former MGP Site as a Bakery, Yonkers, NY. 2000.
Worked as senior environmental reviewer and consultant to the redevelopment plan of a site for the planned Greyston Bakery along the waterfront; provided third-party verification to support underwriting of the cost-cap insurance policy. Project Manager.

Environmental Risk Management Program for the Brooklyn Borough Gas Works Site, 1997-1998
Conducted baseline human health and ecological risk assessment of the former manufactured gas plant site (18 acres) along Coney Island Creek. Prepared and supported negotiations of remedial objectives and target cleanup levels. The project also required supporting a risk communication program of newsletters, public documents, public meetings, and hearings. For Brooklyn Union / KeySpan Energy. Project Manager and lead author.

Environmental Risk Management Program for the Brooklyn Borough Gas Works Site, 1997-1998

Conducted baseline human health and ecological risk assessment of the former manufactured gas plant site (18 acres) along Coney Island Creek. Prepared and supported negotiations of remedial objectives and target cleanup levels. The project also required supporting a risk communication program of newsletters, public documents, public meetings, and hearings. For Brooklyn Union / KeySpan Energy. Project Manager and lead author.

Publications and Papers

Co-Author with D.K. Wojcicki, *Resolving Environmental Risk Management Dilemmas Associated with the Development of Pesticide Impaired Real Estate.* , In preparation ,

Author, *Lack of Correlation of Adverse Health Outcomes and Affirmative Court Findings to Hazardous Waste Sites and Brownfields Contaminated with Polycyclic Aromatic Hydrocarbons.* , In preparation ,

Co-Author with J.M. Daly and H.W. Knoche, *The Binding of Host Selective Toxin Analogs to Mitochondria from Normal and "Texas" Male Sterile Cytoplasm Maize* , Plant Physiology , 83:863-868, 1987.

Author, *Risk-Based Analysis for Environmental Managers* , Lewis Publishers/CRC Press , Boca Raton, FL, 2001

Author, *Using Risk Appraisals to Manage Environmentally Impaired Properties* , VHB SiteWorks, Watertown, MA , Report 108, 28p, 1999.

Author, *Risk-Based Analysis* , The Brownfields Newsletter , 3(17) 1, King Communication, Washington, D.C., August 27th Issue, 1998.

SUSAN GARDNER
Project Geologist

Summary of Experience

Ms. Gardner is a California Professional Geologist who has worked for Kleinfelder for more than ten years. Her experience includes: environmental site assessment, geotechnical field work and materials testing. Her field activities include: borehole drilling, logging, and soil/rock sampling; groundwater monitoring well installation, developing, and sampling.

Education

BS, Geology, California State University, Sacramento, California, 2000

Registrations

Professional Geologist (P.G.), No.8183, California,

Certifications

NICET - Soils, No. 109368, Level II, NICET, 2003
NICET - Concrete, No. 109368, Level II, NICET, 2003
NICET - Asphalt, No. 109368, Level II, NICET, 2003
DOT - Caltrans, 2003
ACI - Field, No. 078745, Level I, ACI, 2001
Nuclear Gauge/Troxler, No. 094279, 2001

Professional Affiliations

Association of Engineering Geologists .

Project Experience

The following is a representative selection of Susan Gardner's project experience.

California Highway Patrol Academy, West Sacramento, California.
Prepared proposals, prepared work plans, conducted sensitive receptor survey and coordinated sampling events for investigation of soil and groundwater contamination by leaking underground gasoline storage tank.

Geer Road Landfill, Stanislaus County, California. - From May 2006 To present
Responsible for coordination of sampling events, preparation of monitoring reports and tracking of deadlines. Maintains landfill library records.

Fink Road Landfill, Stanislaus County, California. - From May 2006 To present
Responsible for coordination of sampling events, preparation of monitoring reports and tracking of deadlines. Maintains landfill library records.

California Highway Patrol Academy, Napa, California.
Prepared proposals, prepared work plans, organized installation of additional monitoring wells and coordinated sampling events for investigation of soil and groundwater contamination by leaking underground gasoline storage tank.

Aerojet General, Sacramento, California.
Responsible for oversight of drilling operations for the purpose of construction and installation of on and off-site groundwater monitor and extraction wells. Monitor drilling operations, keeping detailed well logs and collecting soil and groundwater samples. Supervise well construction and submit detailed well construction statistics and diagrams.

Cable Car Wash - Groundwater Assessment, Davis, California. - From Nov 3, 2003 To Nov 4, 2008
Three 10,000-gallon gasoline USTs were removed from this site in 1988. The former tanks were found to have impacted soil and groundwater. Since 2003, Kleinfelder has assisted Cable Car Wash with investigation, monitoring, and regulatory coordination at the site. As Project Manager, she is responsible for coordinating quarterly groundwater monitoring, sampling, and reporting. She has overseen preparation of remedial action plan, installation of ozone injection points, and conducting of injection events sampling, and reporting for remediation of soil and groundwater.

Geer Road Landfill - South Area Groundwater Investigation Report. Stanislaus County, California - From Jul 31, 2006 To Jun 1, 2007
Project Manager. Provided a Groundwater Investigation Report for Geer Road Landfill, located in Stanislaus County, California. Groundwater and soil gas were sampled from soil probes (hydropunch), existing gas probes, one existing groundwater monitoring well and the Turlock Irrigation Canal.

Awards

Materials Technical Excellance Award, 2003
For work on Richmond-San Rafael Bridge Seismic Retrofit Metals Testing

CAROL HALL
Environmental Project Manager

Summary of Experience

Ms. Hall has 22 years of environmental project experience in the areas of regulatory compliance, environmental audits, Phase I and II environmental site assessments, environmental project management, and data management. Ms. Hall works on multi-disciplinary projects involving assessment of water quality, hazardous material and waste management issues. She has prepared regulatory analyses and provided technical leadership in federal Superfund projects and California Environmental Quality Act (CEQA) projects. Her work experience includes environmental project management for the Department of Defense, Department of Energy and other federal agencies; State of California and local agencies; financial institutions; legal firms; industry, and business.

Education

BA, Social Science, Michigan State University, Michigan, 1979
Certificate, Biology, Field Ecology, Los Rios Community College, Sacramento City College, California, 2006

Registrations

Registered Environmental Assessor I (R.E.A. I), No.05109, Cal-EPA, CA, 1993
Certified Hazardous Materials Manager (C.H.M.M.), No.13688,

Certifications

OSHA 40-Hour HAZWOPER, OH&S Group, NAT, 1990

Professional Affiliations

Academy of Certified Hazardous Materials Managers, Northern California Chapter Board Member; Sacramento Section Programs Director 2006-2008, Sacramento Section Chair 2008-2009 .
Academy of Certified Hazardous Materials Managers, Government Affairs Subcommittee Member .
Institute of Brownfield Professionals .
California Waste Association .
American Society for Testing and Materials (ASTM) , Member E50 Committee and E50.01 Subcommittee Member, Environmental Assessment, Risk Management & Corrective Action .

Project Experience

The following is a representative selection of Carol Hall's project experience.

Audits/Regulatory Compliance

Environmental Audits, United Agri Products, Agri-Team Members and Industrial Facilities, Various locations in California.
Conducted environmental compliance audits at various agricultural product storage and industrial facilities. Facilities included product warehouses, aboveground product storage tanks, bulk repackaging facilities, mixing and other process areas, and formulators. Several sites have included underground fuel storage tanks, above ground hazardous waste tanks, and vehicle and equipment maintenance shops. Included assessment of air emissions, water discharges, hazardous materials management, and hazardous waste storage and transportation. Reviewed local administering agency records and site records at the time of the site reconnaissance. Findings and recommendations, including estimated costs, were included in the assessment report.

Environmental Audits, Helena Chemical Company, Western Area Power Administration, Various Agricultural Distribution Facilities, Manufacturing Facilities, Mining Operations, Arizona and California.
Provided technical lead for the audits in the areas of water quality, EPCRA community right to know, hazardous materials and hazardous waste compliance. Water quality issues included Spill Prevention Control and Countermeasure (SPCC), NPDES Permitting, and storm water issues. Also assisted with landfill and aboveground and underground storage tank assessments.

Hazardous Material Business Plan, Confidential Client, Various Counties.
Reviewed prior document submittals. Contacted County representatives in more than 20 counties for more than 100 small quantity generator sites. Negotiation of submittal deadlines and fees was successfully conducted. Provided a matrix of information to assist with organization of reporting.

Land Disposal Restrictions and ARARS, Department of Defense, Sacramento Army Depot, Sacramento, California.
Researched land disposal restrictions (LDRs) for mixed waste and other waste. Risk analysis database prepared. Completed a matrix of the Applicable or Relevant and Appropriate Regulations (ARARs) for two operable units at the EPA Superfund site.

Kiewit Environmental Compliance Audits, Various Locations, California. - From 1/1/08 To 6/1/08
Conducted file review audit of confidential client's two precast concrete facilities in the San Francisco Bay Area and Stockton, California, which included review of regulatory documents, procedure manuals, inspection reports, hazardous waste manifests and other reporting documents (e.g. SPCC, NPDES and SWPPP). Prepared preliminary summary list of findings. Provided senior review of preliminary findings for Portland, Oregon precast facility audit.

Historical Site Assessment

Phase I, Environmental Site Assessments (ESA), Various Confidential Clients.
Phase I ESAs were conducted according to ASTM standards and client specific standards, for a broad range of clients including banks, REITs and other financial institutions, real estate developers, attorneys, industry, and commercial businesses. Environmental conditions likely to affect the sites were evaluated. Several of the Phase I site assessments have been of corridors ranging from 1 mile to 24-mile spans for pipeline routing (Mohave Pipeline), light-rail/transportation routing (Joint Power Authority), or recreational area development (Napa River). The sizes of the sites range from less than one acre to 20,000-acre parcels. Other Phase Is have been conducted for residential/school/recreational site development (e.g., urban redevelopment areas, or proposed subdivisions), agricultural properties, former and active landfills, and commercial/industrial property transfers. Tasks included review of regulatory agency files; historical information including chain-of-title, aerial photo analysis, and Sanborn Map review; and geological and hydrogeological characterizations for surrounding areas. A site reconnaissance was conducted to evaluate current site conditions, and "Key Site Managers" were interviewed about current and historical property use.

Phase II, Environmental Site Assessment, Various Confidential Clients.
Phase II assessments primarily resulted from findings associated with Phase I ESAs completed. Managed projects involving collection of soil, well, and surface water samples for laboratory analyses, hazardous waste disposal, additional historical or regulatory agency records review, land surveys, and geophysical investigations. Sites assessed included former landfills, agricultural properties, industrial facilities, commercial facilities, and residential properties.

Environmental Planning & Permitting

Negative Declaration/ Environmental Permitting, Meyer Cookware, Inc., Vallejo, California.
Prepared documents and coordinated of resources to develop a mitigated Negative Declaration, pursuant to the requirements of CEQA and local administering agencies. Tasks included interviews with vendors supplying equipment and materials to develop a list of potential hazardous substances. Mitigation measures were developed for reducing the potential impacts to the environment. Developed a proposed time line for additional environmental permitting submittals.

Negative Declaration, Hunt Wesson, Oakdale, California.
Prepared documentation in support of a Negative Declaration for a new power distribution station, including portions of the Initial Study. Conducted a site reconnaissance, researched site selection issues, and assisted in negotiations with the City of Oakdale Planning Department.

Hazardous Materials/Hazard Evaluation, Twelve Proposed Housing Project Sites, Folsom, California.

Regulatory agency database evaluation for twelve proposed affordable housing project sites in support of the Hazardous Materials/Hazard section for an Initial Study. Site reconnaissance conducted to obtain site setting information (e.g. structures and geology) and document the actual or potential environmental conditions on the sites (eg. USTs/ASTs, evidence of prior land use associated with hazardous materials, wells, sumps, etc.).

Rosetta Resources, Due Diligence Assessment, Rio Vista, California. - From 02/2007 To 09/2007
Prepared area-wide due diligence assessment for natural gas pipeline acquisition project. The study area was an approximately 42-mile area of Rio Vista, California. Pipelines and substations were formerly owned and operated by Pacific Gas & Electric Company (PG&E). Hazardous substance/petroleum product release reports and other operating data provided by PG&E were reviewed for ongoing potential impact following acquisition, as well as standard document review under ASTM requirements.

Water Quality

Drinking Water Source Assessment and Protection Program Documents, Confidential Client, Lincoln, California.
Prepared document to evaluate the feasibility of the proposed source (well) locations. The evaluation included limited historical and regulatory agency database review of site and surrounding area that was used to develop a Potential Contaminating Activities (PCAs) inventory. Prepared Physical Barrier Effectiveness Checklist and Well Data Sheet for groundwater sources. PCAs were ranked according to the vulnerability relative to the potential groundwater source.

Spill Prevention Control and Countermeasure Plan (SPCC), Various Confidential Clients, California.
Provided senior review for SPCC Plans prepared by other Kleinfelder regions. Prepared numerous SPCC Plans for agricultural distribution facilities throughout Californa. Conducted site visits to update SPCC Plans prepared for two federal Air Force bases by another contractor. Prepared SPCC Plans for a chemical plant and other manufacturing plants, an oil storage and distribution center, a northern California city utility district (5 facilities), a regional utility district (2 facilties, a regional airport system (2 airports), a federal utility, golf courses (2 facilities), a hospital facility, a winery, a water treatment plant, construction materials yards (2 facilities), and a food distribution facility. Five state government maintenance facility SPCC Plans were prepared following a preliminary evaluation of their 15 sites for applicability to 40 CFR Part 112 requirements. Developed report format that streamlined multiple site reporting and met federal and state reporting requirements.

Stormwater Pollution Prevention Plan (SWPPP), Elk Grove Waste Water Treatment Plant, Elk Grove, California.

Prepared SWPPP documents for construction activity associated with expansion of existing offices at a waste water treatment facility.

Stormwater Pollution Prevention Plan Review, State of California, Butterfield Way, Sacramento, California.
Reviewed maps and information provided for peer review concerning the proposed stormwater best management practices to be implemented at the construction site.

SAFCA Area Wide Due Diligence Environmental Assessment for Natomas Basin Levees, Sacramento and Sutter Counties, California. - From 10/2007 To Present
Carol Hall is the project manager and technical director for this area-wide due diligence assessment of properties owned by approximately 950 individual land owners along the Sacramento River, Natomas Cross Canal, Pleasant Grove Creek Canal, Natomas East Main Drainage/Steelhead Creek, and American River, which form the boundaries of the Natomas Basin in Sacramento and Sutter Counties. The parcel boundaries for this assessment cover about 45 perimeter miles of terrain. The purpose of the due diligence assessment is to evaluate environmental conditions that may affect the proposed levee upgrade project. In order to efficiently assess this large area in a timely and cost-effective manner, the due diligence assessment will be conducted in phases. In the preliminary evaluation, Kleinfelder will screen properties for potential presence of hazardous materials, recognized environmental conditions (RECs), and identify “significant data gaps”. Based on the results of the preliminary evaluation, individual properties with potential RECs will be further evaluated in accordance with the American Society for Testing and Materials (ASTM) Phase I Environmental Site Assessment Process (ASTM E 1527-05). For selected properties suspected of having hazardous materials contamination, sampling will be conducted to evaluate the nature and extent of contamination and need for remediation.

Tasks associated with this due diligence evaluation include regulatory agency and records review; evaluation of physical site characteristics, including geology and hydrology; historical land use review including aerial photographs, topographic maps, zoning/planning maps, Sanborn maps, building department records and city directories; site reconnaissance to observe features indicative of potential RECs; interviews of owners/occupants; GIS data management; and reporting.

SAFCA Domestic Water Well Assessments for Natomas Basin Levees, Sacramento and Sutter Counties, California. - From 2/2009 To Present
Project manager for domestic water well assessments along the waterways associated with the SAFCA Natomas Leveee Improvement Program. Pre- and post-construction assessment comparison to Safe Drinking Water requirements.

SAFCA Limited Phase II Site Assessments for Natomas Basin Levee, Sacramento and Sutter Counties. - From 2/2008 To Present
Project manager for numerous limited Phase II sampling sites associated with the SAFCA Natomas Levee Improvement Program. Approximately 20 sites included based on the results of Phase I Environmental Site Assessment evaluaion. Also, numerous borrow

material locations evaluated for pesticides and metals in predominantly agricultural land use sections of the study area. Pre-construction and post-construction soil and groundwater sampling, hazardous substance and petroleum product impact evaluation, and remediation alternative evaluation as applicable.

Seminars/Training

Biology, Field Ecology Career Certificate, Sacramento City College, May 2006. .

Sacramento County, Preparing and Implementing Storm Water Pollution Plans for Construction Projects. .

Attendee, Classroom. International Bird Rescue Research Center and WildRescue. Wildlife Emergency Response I. Certificate of Completion awarded for 8-hour program on animal capture strategies, handling techniques, and rescue procedures. Length: 1 day. Date Completed: 01/31/2009.

Attendee, Classroom. ASTM International. ASTM Training on Phase I and Phase II Environmental Site Assessments for Commercial Real Estate. Technical and professional training by ASTM.. Length: 1 day - 1 week. Date Completed: 10/30/2008. CEUs: 2.1.

BRIAN HONEA
Geologist

Summary of Experience

Mr. Honea has used his geology background and 10 years of progressively responsible experience to develop a broad knowledge of soils and construction materials. His responsibilities as a Senior Engineering Technician have included field and laboratory testing of construction materials, including soils, concrete, masonry, asphalt pavements and steel building components. He has participated in numerous geotechnical projects, including soil sampling, pile-load testing, monitoring of reinforced earth slope construction and assisted in the development of dewatering systems for stadium construction.

Education

BS, Geology, California State University, Sacramento, California, 1985

Certifications

NICET - Field, Level II,
ICBO - Reinforced Concrete,
ICBO - Masonry,
ICBO - Fireproofing,
ACI - Field, Level I,
Nuclear Gauge/Troxler,
OSHA 40-Hour HAZWOPER,

Project Experience

The following is a representative selection of Brian Honea's project experience.

General

UC Davis Wastewater Treatment Plant, UC Davis, Davis, California.
Provided oversight for field density testing of engineered fill placement for various components of the wastewater treatment plant including oxidation ditch, clarifier, and force main. Services included density testing and observation services related to site preparation, placement of all engineered fill and trench backfill, roadway subgrades, and all foundation excavations. Responsible that all tests and inspections were performed in accordance with contract standards, plans and specifications.

Meadowview Community Center, City of Sacramento, California.
Responsible for soil testing and observation for earthwork placement during construction of facilities, roadways, and associated utilities. Assisted in construction, commissioning, and operation of a soil and groundwater remediation system to remove tetrachloroethylene (PCE) and Naptha Solvents released from two former dry cleaning facilities previously located at the site.

Installation Restoration Program, Sacramento Army Depot, U.S. Army Corps of Engineers, Sacramento, California.
Responsible for field sampling and groundwater monitoring. Collected data and prepared reports in for remediation investigation and feasibility study (RI/FS) under the Comprehensive Environmental Response, Compensation and Liability (CERCLA) for the Superfund site.

Lighthouse Marina and Riverbend Development, West Sacramento, California.
Responsible for observation and testing of soils during levee and building lot construction and reinforced earth slope buttressing of riverside levee slopes.

Treelake Village Subdivision, Placer County, California.
Responsible for testing and observation for site earthwork construction of commercial and residential lots and associated utilities.

City of Galt, California.
Responsible for soils testing for various subdivision. Project involved utility relocations and structural roadway construction.

Aerojet General, Sacramento, California.
Responsible for oversight of drilling operations for the purpose of construction and installation of on and off-site groundwater monitor and extraction wells. Monitored drilling operations, keeping detailed well logs and collecting soil and groundwater samples. Supervised well construction and submit detailed well construction statistics and diagrams. Operated dedicated sampling vehicles using submersible pumps to sample nested multi-completion monitoring wells. Used special equipment handling, cleaning and sampling procedures to maintain the integrity of the samples and reduce the potential for cross contamination between water bearing zones. In addition, performed quarterly plant-wide water level measurements.

Millcreek Landslide, Highway 50, American River Canyon, California.
Part of remediation team that included installation of monitor wells and extensiometers; provided oversight of landslide debris removal and the construction of site drainage systems and protective buttresses.

MICHAEL LAWSON
Senior Professional

Summary of Experience

Mr. Lawson has over 20 years of experience managing and executing environmental and hazardous waste management projects. As a senior engineer and project manager, he has directed staff in their performance of engineering tasks on multidisciplinary projects and served as a senior technical resource in the strategizing and performance of environmental engineering projects. Mr. Lawson is a CA-licensed Professional Engineer (Chemical).

Mr. Lawson's experience includes management of environmental and engineering projects, evaluating and designing waste management and environmental remediation systems, contract administration, construction management, performing feasibility and treatability studies, and providing engineering support for permit applications for numerous clients. He has hands-on field experience with operation and trouble-shooting of numerous remediation and waste management systems. Mr. Lawson has specialized experience in soil vapor extraction, waste incineration and waste stabilization/solidification (S/S). Mr. Lawson is a CA-licensed Professional Engineer (Chemical).

Project Experience

The following is a representative selection of Michael Lawson's project experience.

Esparto Unified School District, Esparto, California.
Prepared of a Removal Action Workplan for arsenic-contaminated soil at a proposed school site. Tasks included conceptual design, cost estimation, statistical evaluation of soil data, agency negotiation, and report preparation.

Atlantic Richfield Company, a BP-affiliated Company, Bay Area, California.
Portfolio Manager for Bay Area retail sites. Managed operation, maintenance, monitoring, and environmental compliance for over thirty retail sites throughout northern California. Directed activities of junior staff and field technicians. Managed repair and upgrade of remediation systems.

Chevron Environmental Management Company, Multiple Site, Bay Area, California,
Managed design, construction, operation, and maintenance of soil and groundwater remediation systems at a dozen retail and commercial sites throughout the San Francisco Bay Area. Project activities included preparation of feasibility studies and corrective action plans, report preparation, remediation system design, preparation of permit applications, management of subcontractors, construction oversight, regulatory interface, and environmental compliance. Mentored and coordinated activities of junior engineers and field technicians. Managed construction projects with aggregate values in excess of $1,500,000.

Air Force Center for Environmental Excellence, Former George Air Force Base, Victorville, California.
Managed remedial investigation and feasibility study preparation for a major release of jet fuel. Project activities included investigation, report preparation, remedial system design, construction and operation, regulatory interface and environmental compliance. Managed project budgets in excess of $1,000,000.

Air Force Center for Environmental Excellence, Beale Air Force Base, California
Managed project for installation of particulate control devices on in-use, stationary compression-ignition engines. Evaluated and interpreted new air emissions control regulations and recommended technical approach for engine retrofit while minimizing disruption to the client facility mission. Total project value exceeded $300,000.

Confidential Client, Western Michigan
Remediation of chlorinated compounds and metals at a leather tannery. Tasks included feasibility study, design and construction management of an air sparging system for removal of volatile chlorinated compounds and in situ oxidation of dissolved metals in groundwater.

City of Owosso, Michigan
Remediation of chlorinated solvents at the redeveloped site of a former manufacturing facility. Tasks included feasibility study, design, and construction management of a slurry wall for containment of contaminants in groundwater and vadose zone soils.

Wisconsin Fuel & Light Co., Manitowoc, Wisconsin.
Remediation of coal tar contamination at a former coal gas manufacturing site. Tasks included a feasibility study, and treatability study and pilot testing of in situ solidification/stabilization of coal tar in site soils and river sediments. Prepared test report documents and coordinated regulatory issues.

Confidential Client, Southwest Michigan
Evaluated feasibility of soil vapor extraction for application to wastewater treatment sludge contaminated with volatile organic constituents and polychlorinated biphenyls. Tasks included pilot test planning, execution, and reporting.

U.S. Army Corps of Engineers, Former Kincheloe Air Force Base, Kinross Township, Michigan.
Preparation of plans and specifications for removal of underground and above ground storage tanks, distribution piping, mechanical equipment, asbestos containing materials, and buildings.

California Department of Health Services, Riverside County, California.
Planning and reporting of a hazardous waste incineration demonstration test on contaminated soil from the Stringfellow site in California, a major Superfund site. Tasks performed include preparation of the demonstration test plan in accordance with RCRA

trial burn requirements, preparation of monthly progress reports, the demonstration test observation, and preparation of the demonstration test final report.

Lockheed Aerospace, Burbank, California.
Involved with the design, permitting and operation of a remediation system for chlorinated solvents and dense, nonaqueous phase liquids (DNAPL) in ground water and soils. The treatment system was a first-of-its-kind combination of the Aqua Detox™ vacuum stripper and a Soil Vapor Extraction (SVE) system. The system design featured zero air discharge and recovery of contaminants by condensation. In operation, DNAPL was decanted from recovered ground water. Vapor phase contaminants in air streams from the stripper and the SVE and were adsorbed onto activated carbon. During the carbon regeneration cycle, the contaminants were condensed and decanted as DNAPL.

U.S. Army, Rocky Mountain Arsenal, Denver, Colorado.
Evaluation and design of candidate technologies for treatment of Basin F liquids at Rocky Mountain Arsenal. Tasks included conceptual design, acceptability rankings, evaluation testing, and pilot test planning for incineration equipment.

IBM Corporation, San Jose, California.
Engineering evaluation of virgin and waste solvent and wastewater handling and storage facilities. Reviewed design of piping, tankage and instrumentation in numerous tank farms, underground waste vaults, and distribution trenches and tunnels. Reviewed maintenance and operating procedures and the site contingency plan for appropriateness. Participated in the preparation of Spill Prevention, Control and Countermeasures (SPCC) and Best Management Practices (BMP) plans.

General Atomics (formerly GA Technologies), La Jolla, California
Design of incinerator subsystems for prototype hazardous waste incinerator. Designed or codesigned extractive flue gas analysis system, liquids pumping station and wet scrubbing system. Managed procurement, fabrication, and installation of equipment items. Studied waste incineration issues, including thermodynamics for high-temperature acid gas capture, volatilization of polychlorinated biphenyls (PCBs) in soil drying operations, fuel feasibility studies, and regulatory compliance of incinerator and ancillary systems. Lead shift operator of prototype hazardous waste incinerator. Participated in over twenty individual test burns on various materials, including soil contaminated with PCBs, sewage sludge, chlorinated solvents, refuse derived fuel (RDF), toluene diisocyanate, and malathion. Responsible for equipment operation, data acquisition, test planning, reporting, trouble-shooting, maintenance, and safety during shift operations.

Publications and Papers

Lead author, *In Situ Solidification/Stabilization Pilot Study for the Treatment of Coal Tar Contaminated Soils and River Sediments* , Stabilization and Solidification of Hazardous, Radioactive, and Mixed Wastes, ASTM STP 1240, T. Michael Gilliam and Carlton C. Wiles, Eds., American Society for Testing and Materials, Philadelphia , 1996 , Pilot study of solidification/stabilization of coal tar-contaminated media

MARK LEE
Senior Environmental Technician

Summary of Experience

For the past 20 years, Mr. Lee has provided field support for site assessment projects. He performs groundwater sampling using dedicated and non-dedicated pump systems and maintains water and soil sampling equipment and field safety equipment. He is trained in the use of the Global Positioning System (GPS) for determining site specific locations of various landmarks. In addition, Mr. Lee oversees the environmental services department equipment, which includes automotive and truck maintenance, supply inventory, and transportation coordination. Mr. Lee is health and safety trained in accordance with 29 CFR 1910.120.

Certifications

Asbestos Inspector, No. 05-3773, CAL/OSHA,
Lead-Based Paint Inspector, No. 15884,
Asbestos Hazard Emergency Response Act (AHERA) Certified,

Project Experience

The following is a representative selection of Mark Lee's project experience.

General

Installation Restoration Program, Sacramento Army Depot, U.S. Army Corps of Engineers, Sacramento, California.
Conducted quarterly groundwater sampling at the dedicated pump systems in accordance with the site-specific health and safety plan and chain-of-custody procedures at the Superfund site.

Monitoring, Forward Landfill, Stockton, California.
Conducted lysimeter, landfill gas, ash and groundwater sampling in accordance with the site-specific health and safety plan and the chain-of-custody procedures.

Quarterly Monitoring, Foothill Sanitary Landfill, Stockton, California.
Conducted surface and groundwater sampling in accordance with the site-specific health and safety plan and the chain-of-custody procedures to comply with quarterly monitoring requirements.

Fink Road Landfill, Stanislaus County, California.
Conducted lysimeter, landfill gas, groundwater, surface water, and leachate sampling in accordance with the site-specific health and safety plan and the chain-of-custody procedures.

Geer Road Landfill, Stanislaus County, California.
Conducted groundwater and surface water sampling in accordance with the site-specific health and safety plan and the chain-of-custody procedures for this now closed landfill.

California Rice Industry Association, California Department of Pesticide Regulation (DPR), Sacramento, California.
Collected water samples from eight locations along the Sacramento River Drainage Basin.

Sisters of Mercy Campus, Auburn, California.
Performed hazardous materials surveys of proposed renovations for the Sisters of Mercy facility. Based on the findings of our hazardous materials survey, several building materials were identified as containing asbestos and included: various vinyl floor tiles and mastic, various sheet vinyl flooring materials, Thermal System Insulation (TSI), sink insulation, exterior window caulking, asbestos cement pipe ("Transite"), drywall and joint compound, various ceiling tiles and associated mastic, basecove mastic and carpet adhesive. Components painted with lead-based paint (LBP) and lead-containing paint (LCP) were also identified during the survey. Conducted contractor oversight during removal, performed pre- and post-abatement visual surveys and clearance air monitoring at the conclusion of each phase of removal.

Asbestos and Lead Paint Survey, University Enterprises Inc, Sacramento, California - 2005
Conducted asbestos and lead paint survey of selected buildings at a Former California Youth Authority (CYA) Property in Sacramento, California. The buildings surveyed included the Mower Shop, Storage Shed by Tank, Storage Yard Shed, Green House, Maintenance Warehouse, General Shop, Firehouse Training Center, Residence, and Construction Office. The purpose of the survey was to evaluate the locations, condition, and quantities of building materials containing asbestos and/or lead based paint that might be disturbed during planned building demolition.

Asbestos and Lead Based Paint Survey, Cloverdale, California - 2007
Conducted an asbestos and lead-based paint (LBP) survey at the former Cloverdale Mill in Cloverdale, California to evaluate the location, condition, and quantity of asbestos containing materials (ACM) and LBP. The survey was conducted in general accordance with the United States Environmental Protection Agency (EPA), Department of Health Services (DHS) and California Occupational Safety and Health Administration (Cal-OSHA) standards and protocols, and standards of the local air quality management district.

Asbestos and Lead Based Paint Survey, West Sacramento, California - 2008
Conducted an the Asbestos and Lead-Based Paint Survey at a Reclamation District Pump Station in West Sacramento, California to evaluate the locations, condition, and quantity of potentially hazardous asbestos containing material (ACM) and Lead-Based Paint (LBP) that might present a potential worker safety hazard and/or might require special

handling and waste disposal as part of planned building demolition. The survey was conducted in general accordance with the United States Environmental Protection Agency (EPA), California Department of Public Health (CDPH) and California Occupational Safety and Health Administration (Cal/OSHA) standards and protocols.

Asbestos and Lead Based Paint Surveys, Sacamento and Sutter Counties, California – 2008-2009
Conducted asbestos and lead-based paint surveys on multiple properties in the Natomas Basin in Sacramento and Sutter Counties. Surveys were conducted to evaluate the location, condition, and quantity of potentially hazardous asbestos containing material (ACM) and lead-based paint (LBP) that might present a potential worker safety hazard and/or might require special handling and waste disposal as part of planned building demolition.

The asbestos surveys consisted of a site investigation to identify and collect bulk samples of suspected ACM building materials, laboratory analysis of bulk samples collected by polarized light microscopy (EPA600/R-93/116) to assess asbestos content, and an assessment of the physical condition of the suspect ACMs observed.

The lead-based paint surveys consisted of a site investigation to identify and collect samples of suspected LBP and coatings observed on building components, laboratory analysis of paint chip samples collected by flame atomic absorption spectrometry (SW846-3050B-7420) to assess lead content, and an assessment of the physical condition of the suspected LBP.

These surveys were conducted in general accordance with the standards and protocols of the United States Environmental Protection Agency (EPA), California Environmental Protection Agency (Cal-EPA), California Department of Public Health (Cal-DPH), and California Occupational Safety and Health Administration (Cal-OSHA), as applicable.

Site Reconnaissance, Phase 1 ESA, Sacramento County, California - 2009
Conducted site reconnaissance and provided assistance with the completion of Phase 1 Environmental Site Assessments (ESAs), for 5 rural properties in Sacramento County. These parcels were being evaluated as part of an Area Wide Due Diligence Assessment for the Sacramento Area Flood Control Agency (SAFCA). The purpose of the ESA was to assist the client in the evaluation of potential recognized environmental conditions at the site.

JENNIFER MEYER
Senior Health and Safety Manager

Summary of Experience

Ms. Meyer is a Certified Industrial Hygienist (CIH) and Certified Hazardous Materials Manager (CHMM) with over 19 years of diverse technical experience in environmental and health and safety projects for government and general industry clients including state and federal agencies, real estate and law firms, transportation, communication, and construction companies. Ms. Meyer is also an experienced project manager. Her current responsibilities include management and oversight of environmental, health and safety and industrial hygiene projects in the Colorado Region. Ms. Meyer's work experience includes environmental site assessments of properties, Current Condition reports for properties being protected by Conservation Easements and tasks related to remediation system installation and operations and maintenance for sites involving contamination of soils and groundwater as well as building investigation services for contaminants such as asbestos, lead-based paint, radon, microbial and mold investigations and indoor air quality issues. Ms. Meyer provides technical guidance and corporate resource sharing through her role as leader of the Building Investigation, Health and Safety and Industrial Hygiene Practice Group.

Education

MS, Environmental Policies and Management, University of Denver, Colorado,
BS, Biological Sciences, Colorado State University, 1975
American Hygienist Association-Rocky Mountain Section, 2000
American Hygienist Association-Rocky Mountain Section, 2001

Registrations

Certified Industrial Hygienist (C.I.H.), No.8665 CP, American Board of Industrial Hygiene, 2003
Certified Hazardous Materials Manager (C.H.M.M.), No.7473, 2006

Certifications

Air Sampling Certification (NIOSH), NAT, 1989
OSHA 40-Hour HAZWOPER, 2006
AHERA Inspector, No. AE06-002-BI-R-03, CO, 2006
Asbestos Inspector, No. 6344, CO, 2009
AHERA Project Designer, CO, 2006
Asbestos Inspector, No. 6344, 2008
EPA - 40 Hour Air Monitoring/Sampling,
AHERA Inspector, No. BI-00540, SC, 2006
AHERA Inspector, No. AE08-002-BI-R-09, 2008

Professional Affiliations

American Industrial Hygienist Association-Rocky Mountain Section .

AIHA-National .
Academy of Certified Hazardous Materials Manager (Rocky Mountain Section) .

Project Experience

The following is a representative selection of Jennifer Meyer's project experience.

Environmental Site Assessments

Phase I ESA with additional services for asbestos, lead-based paint and hazardous material surveys:
As Project Manager, Ms. Meyer supports multiple national clients such as Wal-mart, Lowe's, Home Depot and Costco during the acquisition and early development stages for construction of new stores. Services provided include completion of a Phase I ESA in accordance the ASTM guidelines, an update of the Phase I ESA when required and observations and sampling for hazardous materials such as asbestos, lead-based paint and universal wastes. Following identification of potential hazardous material issues, Ms. Meyer has assisted clients with the development of abatement specifications, provided contractor selection assistance, coordinated third party oversight and follow through until the site was deemed ready for future development. Ms. Meyer has developed relationships with the local regulators resulting in effective communication allowing for project completions with minimal delays or unexpected costs.

Observations and sampling to determine environmental risks associated with deactivation of FAA radar facilities:
As Project Manager, Ms. Meyer supports a national contract as a sub-contractor and coordinates observations of FAA radar sites for the presence of hazardous materials, environmental impacts of site activities and limited sampling for asbestos-containing materials and lead-based paint. The project includes site observations, limited sampling and development of recommendations for necessary actions required to achieve regulatory compliance during deactivation and decommissioning activities of radar facilities. Project locations across the United States and short time frame from notification to proceed and requirement to be on-site created unique challenges for employee and sub-contractor coordination.

Industrial Hygiene

Asbestos inspections for over 100 facilities across the United States, including Hawaii and remote areas of Alaska:
Ms. Meyer performed inspections following AHERA guidelines for sample collection and analysis. She coordinated an asbestos survey of nine healthcare buildings where all suspect building materials were identified, sampled and assessed for condition. Data was presented in three formats including a written report, a Microsoft Access database and computer aided drafting (CAD) drawings. The survey was used as a tool to prepare an operations and maintenance plan to assist in budgeting and completion of repair, renovation and demolition of the buildings.

Development of sampling plans and remediation techniques for the removal of cadmium containing brushes from the ASDE-3 equipment:
Ms. Meyer developed sampling plans and remediation techniques for this project. The equipment was located above occupied areas of Air Traffic Control Towers. The sensitivity of the potential contamination required informational briefings to tower personnel, union officials, and management personnel. This briefing included information of possible health risks and the process for remediation with work practices to prevent contamination release and safety risks. Ms. Meyer was involved with the original planning stages; coordinated with remediation teams, industrial hygienists, and FAA personnel. She maintained oversight during remediation at towers in Cleveland, OH; Pittsburgh, PA; Philadelphia, PA; Seattle, WA, Portland, OR, and Anchorage, AK; and characterizated and coordinated disposal of the generated wastes nationwide.

Initial evaluation of clandestine methamphetamine laboratories:
Ms. Meyer has performed initial evaluations of properties that have been identified as previous methamphetamine laboratories. The evaluation process includes observations of conditions, research of production methods and development of a sampling plan to evaluate potential contamination associated with the production of methamphetamine. Following receipt of sample analysis results, Ms. Meyer develops a remediation plan for cleanup of the property. After remedial activities, Ms. Meyer re-samples and determines effectiveness of remediation and makes recommendations for human re-occupancy.

Technical Review of Lead Health Protection Plans for the Demolition of Catenary Structures Transit Authority Railroad:
Ms. Meyer provided technical review of the Lead Health Protection Plans for the abatement and demolition of various lead coated steel catenary structures. The plans included outlining acceptable work practices, engineering and administrative controls, determining similar exposure groups and instituting representative air monitoring and wipe sampling plans to assess employee exposures. Additionally, Ms. Meyer provided consultation on medical surveillance results and drafted and implemented a respiratory protection plan for those employees involved in lead emitting operations.

Internal Operations:
Ms. Meyer is responsible for health and safety plan development and compliance including field investigative techniques and accuracy of sampling methodology, equipment calibration and quality control procedures during the performance of remedial investigations and corrective actions conducted at hazardous waste sites and various manufacturing and industrial facilities.

Hazardous Materials

Air Traffic Control Tower in Bridgeport, Connecticut:
Ms. Meyer performed project oversight and environmental monitoring/sampling during all phases of construction activity for the Air Traffic Control Tower in Bridgeport, CT. Ms. Meyer's activities included review of the abatement design and work plan. During

oversight, she worked with the on-site engineer to monitor and modify work practices, as necessary, to meet regulatory compliance with federal, state, and local regulations. She performed on-site analysis of air samples utilizing the NIOSH 7400 method, as well as the collection of air samples to be analyzed for lead during construction impacts of lead-based paint. When impact to un-sampled materials was anticipated, she worked with personnel on-site to determine sampling plans and actions necessary to avoid disturbance of potential asbestos-containing materials or lead-based paint.

Technical Review of Documentation for Property Transfer

Review of environmental documents as part of due-diligence for the property transfer of large development project:
As Project Manager, Ms. Meyer was responsible for coordinating efforts for the review of nine environmental and four geo-technical documents related to a large development project near Denver, Colorado. Approximately 1,800 acres of mixed-use land was scheduled for purchase and the potential owners requested assistance with the due-diligence process. Ms. Meyer coordinated the effort for the review of documents associated with environmental and geo-technical issues for the site. The project involved confidentiality and a quick turn-around to assess potential business risks associated with the property transfer. Working with a large team including multi-disciplined professionals, Ms. Meyer provided the necessary review and recommendations to assist the client in evaluating the business risks with acquiring the property.

Training

LPS Training - From on-going To Present
Ms. Meyer is responsible for training Kleinfelder employees and subcontractors on the Loss Prevention System (LPS), a behavior-based safety program that is an “organized, common sense” approach based on over 30 years of research, field trials and experience. This training includes awareness, 8-hour initial and annual refresher training.

Health and Safety Training
Ms. Meyer has provided training on a variety of OSHA standards including Hazard Communication training, Lock/out-Tag/out training, Excavation Safety training, asbestos awareness training, Methamphetamine Laboratory Awareness training and Mold/Moisture Intrusion Awareness training. This training is provided for a variety of clients including, property owners, real-estate associates, facility managers and on-site scientists and engineers.

HAZWOPER 8-hour Refresher Classes
Ms. Meyer provides training in accordance with 29 CFR 1910.120 for Kleinfelder employees and for clients. The course combines the requirements of the standard and scenarios that allow the participants to put elements of the classroom requirements into practical applications that they might encounter in their workplaces. Ms. Meyer approaches each class in a unique manner to make it applicable to the attendees.

JOHN PEMBERTON
Geologist

Summary of Experience

Mr. Pemberton is a geologist at the Sacramento office. He has contributed to both environmental and geotechnical projects. Mr. Pemberton has valuable experience in both field and office work. His field work includes: environmental site assessments, soil and groundwater sampling, borehole drilling, logging and soil/rock sampling. In the office, Mr. Pemberton has evaluated data, prepared numerous scientific and regulatory reports and performed laboratory analysis.

Education

BS, Geoscience, University of Iowa, Iowa, 2006

Project Experience

The following is a representative selection of John Pemberton's project experience.

California Highway Patrol Academy, West Sacramento, California.
Inspected removal of irrigation well. Assisted with office work and field preparations.

Cable Car Wash, Davis, California.
Monitored sampling events for investigation of soil contaminated by leaking underground gasoline storage tank. Assisted with installation of ozone spargers.

Ken's Buff and Plating, Sacramento, California.
Conducted a Geoprobe soil and groundwater assessment, logged boreholes, collected samples and prepared a report of the findings.

Raley's Fuel Station, Fair Oaks, California.
Collected and prepared soil samples potentially contaminated by hydrocarbons for laboratory analysis. Prepared report of the findings.

Aerojet, Sacramento, California.
Participated in quarterly monitoring well water level measurements.

SAFCA Natomas Levee Design, Sacramento, California.
Prepared underground service alerts for drill sites. Conducted soil logging from on-site borehole drilling. Also performed laboratory analysis on collected soil samples.

BRIAN URBICK
Environmental Scientist

Summary of Experience

Mr. Urbick is an Environmental Scientist for the Kleinfelder Sacramento office. He has experience in many environmental fields which include: environmental site assessments, groundwater quality monitoring and report writing, and data validation for a variety of projects.

Education

BS, Environmental Chemistry, California State University, Chico, California, 2007

Project Experience

The following is a representative selection of Brian Urbick's project experience.

Environmental Work

CHP Environmental Sampling, Northern California. - From 08/12/07 to 2009

Conducted various ground water sampling activities, soil vapor sampling, site investigations and prepared ground water reports, closure letters and other regulatory documents in association with CHP sites located in: West Sacramento, Grass Valley, and Arcata.

DTSC-Victor, 20th Street, Chico, California. - 2007
Oversaw the installation and implementation of permeable diffusion bags (PDBs) and harness systems in over 50 groundwater monitoring wells in conjunction with California Department of Toxic Substances Control staff.

Cable Car Wash, Davis, California. - From 09/20/07 to 2009
Mr. Urbick has conducted multiple ground water sampling events in association with the Cable Car Wash site. He also assisted with the recent installation and sampling of ozone sparging wells on site.

Aerojet (Gencorp) Environmental Sampling, Sacramento County, California. - From 10/03/07 to 12/31/08
Mr. Urbick has been responsible for ground water sampling at the Aerojet facility and surrounding properties in Rancho Cordova. He participated in many large scale sampling projects and specialty sampling projects in conjunction with Aerojet personnel.

Phase I, Environmental Site Assessments (ESAs) - From 07/30/07 to 2009
Mr. Urbick conducted ESAs according to ASTM standards and client specific standards, for a broad range of clients including banks, REITs and other financial institutions, real estate developers, attorneys, industry and commercial business. Environmental conditions likely to affect the sites were evaluated. The sizes of the sites range from less than one

acre to several hundred acre parcels. Phase Is have been conducted for retail development, subdivision development and agricultural properties. Tasks included review of regulatory agency files; historical information including chain-of-title, aerial photo analysis, and Sanborn Map review; and geological and hydro geological characterizations for surrounding areas. He conducted site reconnaissance to evaluate current site conditions, and "Key Site Managers" were interviewed about current and historical property use.

SAFCA Area Wide Due Diligence Environmental Assessment for Natomas Basin Levees, Sacramento and Sutter Counties, California - From 02/01/08 to 2009
Brian Urbick is a site coordinator for this area-wide due diligence assessment of properties owned by approximately 950 individual land owners along the Sacramento River, Natomas Cross Canal, Pleasant Grove Creek Canal, Natomas East Main Drainage/Steelhead Creek, and American River, which form the boundaries of the Natomas Basin in Sacramento and Sutter Counties. The parcel boundaries for this assessment cover about 45 perimeter miles of terrain. The purpose of the due diligence assessment is to evaluate environmental conditions that may affect the proposed levee upgrade project. In order to efficiently assess this large area in a timely and cost-effective manner, the due diligence assessment is conducted in phases. In the preliminary evaluation, Kleinfelder has screened properties for potential presence of hazardous materials, recognized environmental conditions (RECs), and identified “significant data gaps”. Based on the results of the preliminary evaluation, individual properties with potential RECs are further evaluated in accordance with the American Society for Testing and Materials (ASTM) Phase I Environmental Site Assessment Process (ASTM E 1527-05). For selected properties suspected of having hazardous materials contamination, sampling is conducted to evaluate the nature and extent of contamination and need for remediation.

Rice Pesticide Monitoring - From 12/01/07to 2009
Mr. Urbick has collected water samples for several surface water monitoring investigations along local rivers to evaluate potential impacts from pesticides used in rice farming..

Remediation Work

Wickes Forrest Industries, Elmira, California. - From 11/01/07 to 12/01/08
Mr. Urbick conducted remediation system maintenance, work/repair and sampling for the former Wickes Forrest Industries site.

Former Beacon #12429, Sacramento, California. - From 11/01/07 to 2009

Involved in the repair, maintenance, sampling and upkeep of onsite soil vapor extraction and pump and treat remediation system associated with the site.

PAMELA WEE
Senior Program Manager

Summary of Experience

Dr. Wee offers 26 years of experience conducting and managing site remediation and restoration projects, health risk assessments, and Phase I site assessments. Dr. Wee has provided engineering support for Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) investigations at private and federal CERCLA sites. She managed the Sacramento Army Depot Installation Restoration Program, which was a $25 million federal facility CERCLA project. In addition, she has provided air quality modeling and health risk assessments in support of regulatory and permitting activities for facilities regulated under the Resource Conservation and Recovery Act (RCRA).

Education

D.Env., Environmental Science/Engineering, University of California, Los Angeles, California, 1981
MA, Biology, University of California, Riverside, California, 1975
BA, Biology, University of California, Riverside, California, 1973

Registrations

Registered Environmental Assessor II (R.E.A. II), No.20082, CA, 2000

Certifications

OSHA 40-Hour HAZWOPER

Project Experience

The following is a representative selection of Pamela Wee's project experience.

General

Installation Restoration Program, Sacramento Army Depot, U.S. Army Corps of Engineers, Sacramento, California.
Managed the federal facility CERCLA site remediation program, which included project oversight, personnel and budget management, and federal and state agency coordination. Conducted and managed the RI/FS, health risk assessments and developed recommended soil cleanup levels at the facility. With an average contract value of $3 million per year, Dr. Wee coordinated as many as 20 contract modications or delivery orders of engineering and investigative activities at once. These included intrusive and non-intrusive investigations, health risk assessments, and a community relations plan for the basewide IRP.

CERCLA Technical Support, Private Facility, Sacramento, California.
Managed the environmental sampling and analysis program, developed an approach for

validating historical environmental data, and directed preparation of the Quality Assurance Project Plan. Conducted air quality modeling, evaluated chemical toxicity and prepared health risk assessments.

Risk Assessment for RCRA Permit, Confidential Client, Sacramento, California.
Managed a risk assessment of emissions from open burning of waste propellants and explosives at an industrial facility. The risk assessment was prepared for a RCRA permit application, Subpart X.

Air Permitting and Risk Assessment, Confidential Client, Sacramento, California.
Provided air quality modeling and risk assessments for air permitting of groundwater extraction and treatment facilities; RCRA hazardous waste treatment and storage facilities; and specialty chemical manufacturing plants.

Risk assessment for AB2588, Confidential Client, Woodland, California.
Conducted a health risk assessment for compliance under the AB2588 Air Toxics Hot Spots Program.

Phase I Site Assessments, Sacramento Area Flood Control Agency, Sacramento, California.
Managed approx. 25 Phase I Environmental Site Assessments on rural/agricultural properties located adjacent to levees in Sacramento County. Properties were being acquired by SAFCA for their flood management/levee borrow site activities. Assessment also included asbestos and lead-based paint surveys of residential structures on various properties, preparation of abatement specifications and oversight and clearance air monitoring during abatement. Services also included Phase II sampling of soil, groundwater, sediment, and surface water to evaluate VOCs, metals, and TPH in multiple creeks and adjacent properties, including an abandoned landfill disposal area. Health risk evaluations were conducted on selected properties.

On Call Environmental Services, State of California Department of General Services, Sacramento, California
DGS is constructing new office and warehouse facilities at the existing Franchise Tax Board facility in Sacramento. Site grading was to be conducted in an area formerly occupied by a steel fabrication plant. Potential contaminants remaining in soil included lead, TPH, and solvents. Kleinfelder was retained to address hazardous materials prior to and during construction. Activities during the project included review of bid packages, identification of sensitive populations, providing recommendations for hazardous materials handling, ambient air monitoring during grading, on-call testing, disposal and remediation of impacted soils, and compliance with storm water requirements during construction.

On-Call Environmental Services, State of California Department of Water Resources, Sacramento, California.
Project Manager for this contract. Kleinfelder has provided on-call environmental

services to the Department of Water Resources at various facilities including maintenance yards, pumping plants, warehouses, and office buildings. Services have included groundwater monitoring and well installation; asbestos, lead-based paint and mold surveys; baseline air monitoring, abatement oversight and clearance air monitoring in facilities that generally were occupied at the time work was conducted. Kleinfelder has been able to mobilize to the sites quickly to meet the client's schedule, working during non-business hours as needed.

Indoor Air Risk Assessment, General Atomics Building 37, San Diego, California.
Conducted a human health risk assessment for potential indoor air exposures to trichloroethylene (TCE), which was present in soil gas beneath Building 37 at General Atomics facility in San Diego. Used the Johnson and Ettinger model to evaluate subsurface vapor intrusion into the building to assess the potential exposure of employees to TCE vapors that may migrate from subsurface soil to indoor air. Estimated cancer risks and noncancer hazards for areas within the building, based on the building configuration. Interacted with the Department of Toxic Substances Control (DTSC) to define acceptable modeling parameters and ensure that regulatory requirements would be addressed.

Health Risk Assessments, Two Industrial Facilities, Antioch and Hayward, California.
Conducted health risk assessments at two industrial facilities where soil and/or groundwater were contaminated with Total Petroleum Hydrocarbons (TPH), Volatile Organic compounds (VOCs), and metals resulting from either disposal of process wastes to land, or leaking fuel tanks and associated piping. Developed a conceptual site model for each facility, identified chemicals of concern and exposure pathways, and evaluated both cancer and non-cancer health impacts for soil, groundwater and indoor air exposures. Estimated health risks using the methodology recommended by the California Department of Toxic Substances Control and indoor air levels using the Johnson and Ettinger model. Risk assessments were submitted to the Regional Water Quality Control Board and used to assess the need for remediation of these facilities.

Environmental Site Assessments and CEQA Support, Esparto Unified School District, Esparto California.
Kleinfelder was retained by the district's architect to conduct a Phase I Environmental Site Assessment and Preliminary Endangerment Assessment for a proposed new high school. Kleinfelder identified arsenic as a contaminant of concern and potential health risk on this agricultural property. Soil sampling was conducted to assess the lateral and vertical extent of contamination and estimate the volume of soil requiring removal. Kleinfelder also prepared an Initial Study and EIR for the proposed school and provided planning and permitting support to the district.

Various Projects, California Department of Toxic Substances Control (DTSC)
Pamela Wee has worked extensively with regulators in DTSC's Site Mitigation and Brownfields Reuse Program, Statewide Cleanup Operations Division, Office of Military Facilities, and Human and Ecological Risk Division (HERD). DTSC staff within the Site Mitigation Program are responsible for review of Phase I Site Assessments, Preliminary

Endangerment Assessments, and Remedial/Removal Action Workplans. Toxicologists within HERD primarily are responsible for review and evaluation of health risk assessments.

As project manager, she has been responsible for multiple projects requiring DTSC approval including Phase I environmental due diligence for potential land acquisitions in compliance with current ASTM 1527 standard, and Phase II site investigations for agricultural, commercial and industrial properties. Phase II assessments have included soil, soil gas and groundwater investigations, monitoring well installation and sampling, hazardous waste disposal, and asbestos and lead-based paint investigations. Kleinfelder prepared environmental documentation for all soil and groundwater investigations at these sites including work plans, health and safety plans, quality assurance/quality control and data quality management plans, and community relations plans. Kleinfelder has also conducted health risk assessments based on the data collected in accordance with DTSC's Preliminary Environmental Assessment (PEA) methodology; established risk-based clean up goals for sites, which are protective of public health and the environment; evaluated remedial alternatives and costs; and selected appropriate remedial actions.