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PROPOSAL

Ron's Discount Energy Mart
Claymont, Delaware
Vapor Intrusion Investigation

PREPARED FOR

Mr. Christopher Brown, P.G.
Hydrologist
State of Delaware
Department of Natural Resources and Environmental Control
New Castle, DE 19720

January 23, 2009
Kleinfelder Proposal # HANMD9048

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PROPOSAL
For
VAPOR INTRUSION INVESIGATION

Ron's Discount Energy Mart
2509 Philadelphia Pike
Claymont, DE
Project ID # N8811068

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SECTION 1.0 QUALIFICATIONS

Kleinfelder is presenting this proposal for the Ron's Discount Energy Mart, Claymont, Delaware project (Contract # 07-002 TMB) in response to the request from Department of Natural Resources and Environmental Control Tank Management Branch (DNREC - TMB) dated December 16, 2008 and based on additional information received in a pre-bid meeting on December 31, 2008. The proposal is a statement of our understanding of your needs and a description of the project, technical approach, scope of services, project team, fee, and schedule assembled to address those needs. Under the proposed scope of work, Kleinfelder will:

Participate in public meeting with DNREC – TMB and interface with property owners in the Hillside Road neighborhood.

- Kleinfelder is experienced with the activities related to community relations and outreach program from our 20 years of experience working on Superfund sites, and Installation Restoration sites for military installations. As part of the community relations effort, we have prepared Community Relations Plan (CRP) for sites and participated in public meetings.

- Our team is experienced in working with private property owners, securing off-site access agreements, and completing off-site investigations on residential properties.

Assess health hazards that may be associated with petroleum vapor migration into future structures within the boundaries of Ron's Discount Energy Mart (the Site) associated with the proposed future redevelopment, and provide recommendations regarding appropriate remedies.

- Our team is well versed in the application of risk based corrective action (RBCA) and has completed vapor intrusion investigations on our projects throughout the country. Our team is actively involved in national professional organizations including, the National Brownfields Association, American Industrial Hygiene Association and the American Society for Testing and Materials (ASTM). In fact, a Kleinfelder team member co-authored the vapor mitigation section of the new ASTM vapor intrusion standard for real estate transactions.

Kleinfelder's Ranking
Engineering News Record (ENR)
45th "Top 500 Design Firms" (2008)
52nd "Top 200 Environmental Firms" (2007)

- Kleinfelder has experience working with regulatory agencies and developers to design land use controls, mitigation systems, vapor barriers, and remediation programs to allow bring environmentally impaired properties into productive use for the community.

Assess the potential for petroleum vapor migration into the off-site residences along Hillside Road, and if appropriate, provide recommendations for vapor mitigation.

- Our team is experienced in all aspects of vapor intrusion investigations. Our team has designed and executed vapor intrusion investigations involving soil vapor probes, sampling of soil vapor, sub slab soil vapor, ambient air, and indoor air.
- Kleinfelder is presently completing regular soil vapor monitoring on over 60 vapor points, data evaluation, and reporting on 15 projects in the District of Columbia and Maryland.

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Continue the quarterly groundwater monitoring and reporting program for the existing network of monitoring wells.

- Kleinfelder, on behalf of our clients, presently samples and reports the data on over 500 monitoring wells per quarter in Delaware, District of Columbia, Maryland, and Virginia. This required sampling and reporting is completed cost effectively through the use of unit pricing and in compliance with regulatory requirements.

Three project descriptions which detail our capabilities and experience on similar projects are attached.

Project Spotlight

Kleinfelder is managing two large scale remediation projects in Maryland located within residential areas with significant litigation against our client. These two projects represent the two largest remediation projects in North America for this client. On behalf of our client, Kleinfelder operates 24 hr / 7 day a week 800 hotlines for both projects to receive questions, requests, comments or concerns from the public and schedule appointments for field activities. Kleinfelder has presented the technical aspects of the project at public information meetings.

SECTION 2.0 PROJECT BACKGROUND

Kleinfelder reviewed the information on the project provided in the RFP and performed a file review at DNREC's office. Ron's Discount Energy Mart (the Site) is a former service station located in a commercial area along Philadelphia Pike. The property is currently leased to an automotive repair business. This area in the vicinity of the Site along Philadelphia Pike is slated for redevelopment by New Castle County. At this time, the nature of the redevelopment of the Site and vicinity is not known. The area to the east/southeast and downgradient of the Site consists of single family residential homes with basements along Hillside Road. There is a steep slope (+60 feet) to the east/southeast of the facility down Hillside Road towards the Delaware River.

In November 1988, several residences along Hillside Road complained of petroleum vapors in their basements. The origin of the vapors was traced to the sanitary sewer line by DNREC – TMB. The vapor source was identified as a petroleum release from the underground storage tank (UST) system at Ron's Discount Energy Mart. The USTs were removed from the site in 1993 from the northern portion of the site and the area repaved.

In response to the detection of vapors, DNREC –TMB assumed control of the Ron's Discount Energy Mart project and extensive investigation and remedial actions described below were conducted. The investigations have included test pits, geophysical surveys, monitoring well installation, soil and groundwater sampling, and soil vapor surveys. The active network of 9 groundwater monitoring wells located on-site and off-site is shown on **Figure 1**.

A review of the file information indicates that groundwater occurs at approximately 16 feet below grade at the Site within fill material and saprolite (sandy silt) and is reported to be part of a Pleistocene aquifer system. Groundwater flow is controlled by topography following a gradient towards the Delaware River. As this shallow aquifer system extends downgradient it comes close to the surface as the overburden and sands thin out on the steep hillside along Hillside Road. This shallow aquifer system discharges at the surface about 400 feet downgradient from the facility as indicated by the observed seeps and springs in the area of 10-12 Hillside Road.

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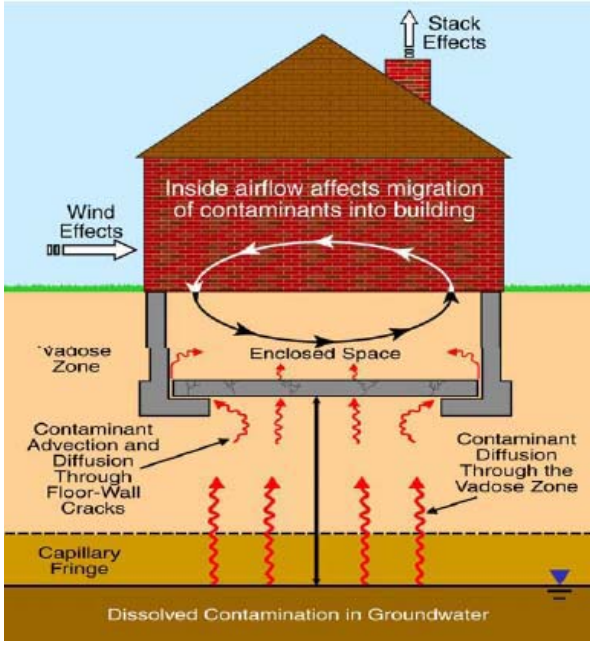
Additionally, groundwater flow is likely preferentially controlled by the sanitary sewer located in the center of Hillside Road. It is reported that the depth of the sewer is 9 feet below grade and the sewer line and backfill intersect the groundwater as the sewer line extends down Hillside Road.

The remedial actions have included groundwater and vapor mitigation at the residences at 10, 11, and 12 Hillside Road. Depth to groundwater in the area of these residences is approximately 4 feet below grade and is at or above the level of the basements. The vapor mitigation efforts at 10 Hillside Road included the installation of a groundwater interceptor trench upslope of the basement that connects to the sanitary sewer (vapors captured in perforated piping in the trench are passively vented to the atmosphere), sealing of cracks in the basement walls and floor, and installation of a trap in the basement floor drain. Mitigation at 11 Hillside Road included enclosing the French drain system and sump in the basement and passively venting vapors captured in the piping to the atmosphere, and repairing and sealing the basement floor. A subsurface drainage system was installed at 12 Hillside Road to mitigate a groundwater seep in the driveway and intercepted groundwater is diverted to the backfill of the sanitary sewer trench below Hillside Road. According to DNREC, reports of vapors by residents greatly decreased after these measures were implemented. The most recent report of possible vapors was in December 2004 at 10 Hillside Road. A review of the file indicates that basements were historically screened for petroleum vapors using hand held volatile organic compound (VOC) detectors; however, no indoor air samples were collected and submitted for laboratory analysis.



In August 2005, the injection of oxygen releasing compound (ORC) was completed in the upper section of Hillside Road to enhance biodegradation of the dissolved phase hydrocarbon plume. A review of the groundwater analytical data indicates that dissolved phase hydrocarbon concentrations have decreased significantly over time since ORC injection and the dissolved phase hydrocarbon plume appears to be relatively stable to decreasing.

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SECTION 3.0 TECHNICAL APPROACH

The goals of the investigation as defined in the December 16, 2008 DNREC request for proposal (RFP) are listed below:

- Assess health hazards that may be associated with petroleum vapor migration into future structures within the boundaries of Ron's Discount Energy Mart (the Site) associated with the proposed redevelopment, and provide recommendations regarding appropriate remedies.
- Assess the potential for petroleum vapor migration into the off-site residences along Hillside Road, and if appropriate, provide recommendations for vapor mitigation.
- Continue the quarterly groundwater monitoring and reporting program for the existing network of monitoring wells.

Based on the goals of the investigation and our technical review of agency files, Kleinfelder proposes to divide the vapor intrusion investigation into three areas as presented in the table below.

Table 1 - Investigation Summary

Designation	Area	Conceptual Site Model	Risk Scenario	Proposed Scope of Work
Zone 1	On-Site Facility	Future Vapor Intrusion	Commercial	Soil Vapor Investigation
Zone 2	2-8 Hillside Road	Vapor Intrusion	Residential	Soil Vapor Investigation
Zone 3	9-12 Hillside Road	Groundwater Intrusion / Preferential Pathway	Residential	Indoor Air Sampling

The investigation zones are depicted on **Figure 1**. The investigation will be performed in general accordance with the DNREC Site Investigation and Restoration Branch (SIRB) March 2007 *Policy Concerning the Investigation, Risk Determination and Remediation for the Vapor Intrusion Pathway*. The Johnson and Ettinger (J&E) model will be utilized to assess potential indoor air health hazards for Zones 1 and 2. The objective for the initial phase of investigation for each zone is presented in the sections below and decision making flow charts for each zone are attached.

ZONE 1

Zone 1 is designated as the on-site facility. The depth to groundwater on-site is 16 feet below grade and this will facilitate the use of both groundwater monitoring and soil vapor data to evaluate the potential for, and risk of, vapor intrusion for future development. The objectives of the proposed investigation activities in Zone 1 are to provide an initial assessment of soil vapor conditions around the facility and enable periodic monitoring of soil vapor concentrations at these locations.

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This investigation will provide the initial data to evaluate future potential for, and risk of, vapor intrusion, guide future decision making for Site redevelopment, and aid DNREC – TMB in decision making for conditions of case closure.

ZONE 2

Zone 2 is designated as the 7 residences located at the upper end of Hillside Road (2-8 Hillside Road). In this area the depth to groundwater increases down Hillside Road and Kleinfelder proposes to use soil vapor data from locations adjacent to the residences to evaluate the potential for vapor intrusion. The objectives of the proposed investigation activities in Zone 2 are to provide an initial assessment of soil vapor conditions around the foundations of the seven (7) residences and enable periodic monitoring of soil vapor conditions at these locations. The Zone 2 investigation will provide the data to evaluate the potential and risk of vapor intrusion into these residences, guide decision making for further investigation (e.g. sub-slab or indoor air sampling) or mitigation if conditions warrant, and aid DNREC – TMB in decision making for conditions of case closure.

ZONE 3

Zone 3 is designated as the four (4) residences located at 9 – 12 Hillside Road. These residences have historically had petroleum odor complaints and groundwater and vapor mitigation has been completed at 10, 11 and 12 Hillside Road. The depth to groundwater at these residences is approximately 4 feet below grade. Prior to mitigation efforts by DNREC – TMB, groundwater seeps were documented in the basement and driveway of 11 and 12 Hillside Road; respectively. Based on these groundwater conditions, soil vapor sampling adjacent to the basement or sub slab soil vapor sampling is not appropriate.

Since the use of soil vapor sampling is not appropriate for Zone 3, preliminary screening was completed using the groundwater analytical data from monitoring well HR-4, which is located adjacent to 10 Hillside Road. The most recent benzene concentration of 0.27 milligrams per liter (mg/L) was multiplied by the Henry's Law Constant and a slab attenuation factor of 0.001 to estimate the benzene concentration in indoor air (61.2 micrograms per cubic meter (µg/m3)). Using this estimated concentration of benzene in indoor air, the risk exceeded 1×10^{-5}. The attenuation factor of 0.001 was obtained from the following source: Sager, S.L., Braddy, L.D., and Day, C.H., 1997, *The Infiltration Ratio in Vapor Intrusion Calculations,* Proceedings of the Society for Risk Analysis Annual Meeting, Washington, D.C., December 9, 1997.

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Based on the limitation of soil vapor sampling in Zone 3 and the preliminary risk screening, direct measurements such as indoor air analysis are the preferred method of assessing vapor intrusion. Sampling the indoor air in these residences is the most direct way to determine exposure where vapor intrusion is suspected and these measurements along with ambient air sampling can be used to assess the performance of the mitigation systems.

ASSUMPTIONS

We propose to complete the work on a time and materials basis for the basic scope described in this proposal to complete the hydrogeologic investigation. Many of the assumptions are included in the appropriate sections of the proposal. Certain assumptions are more generic in nature and are listed below:

- The client will provide Kleinfelder and its subcontractors assistance to ensure that no significant delays occur in obtaining access to the site.
- Field activities will be conducted in Level D personal protective equipment (PPE).
- Field activities will be conducted during normal business hours 8:00 AM to 5:00 PM Monday through Friday. Work completed during non-business hours or on weekends will be subject to a 1.3 multiplier.
- Once field operations begin, there will be no delays incurred as a result of the property owner and government actions including the DNREC or local agencies.
- All investigative derived wastes (IDW) will be classified as non-hazardous and will be disposed of as non-hazardous waste utilizing an approved waste vendor for proper hauling, treatment and disposal.
- Kleinfelder is not responsible for damage to unmarked and/or unknown utilities.
- The technical basis of this proposal will satisfy DNREC requirements for an investigation work plan and no other approval is necessary.
- The groundwater laboratory analysis will be performed by the DNREC Environmental Laboratory.
- The laboratory analysis of air samples will be performed by Lancaster Laboratories, a DNREC SIRB approved laboratory.
- Fees and labor for permitting the soil vapor points are included. If permits are not required, a reduction in fee will be provided to DNREC.
- The fees do not include express mail charges or multiple revisions to the report. On most projects, these services are not required and, therefore, are not included in our proposal.

SECTION 4.0 SCOPE OF WORK

Task 1.0 Project and Regulatory Coordination

This task includes fees associated with the coordination of activities under this phase of the project. Coordination activities include contractor and laboratory coordination and scheduling, client correspondence, scheduling and notifications with the property owners and DNREC.

Kleinfelder will prepare a site-specific Health and Safety Plan (HASP) and Traffic Control Plan prior to the initiation of field activities. The HASP will include specific information regarding proposed site activities by our personnel and subcontractors. The HASP and Traffic Control Plan will be reviewed and approved by a Kleinfelder Safety Officer and Project Manager prior to the commencement of field activities.

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Task 2.0 Quarterly Groundwater Sampling

In accordance with the DNREC RFP, a provision for one year of monitoring has been included. Kleinfelder proposes quarterly monitoring and reporting of the nine (9) existing monitoring wells. Groundwater samples will be analyzed for BTEX, MTBE, naphthalene, isopropylbenzene, TBA, and TAME using EPA Method 8260. The sample analysis will not include ECB, EDC and dissolved lead. The work will be completed in accordance with the Traffic Control Plan and will include the use and positioning of cones, vehicles, and Men Working signs.

Kleinfelder will prepare four quarterly groundwater monitoring reports (GMR) for the submission to DNREC. The GMRs will contain general site information, presentation of the data generated during the reporting period, figures such as groundwater flow map and hydrocarbon distribution maps and historical groundwater gauging and sampling tables. In addition, a review of the data versus Tier 1 RBSLs and recommendations for future course of action will be presented in the report to DNREC.

Task 3.0 Public Information Meeting

Kleinfelder will prepare for and attend a public meeting with DNREC –TMB representatives to discuss the proposed scope of work with residents and stakeholders. This task includes attendance of a planning meeting by two Kleinfelder professionals at the DNREC – TMB office prior to the public meeting. In addition, fees have been included for development of visual aids for the public meeting.

Project Spotlight

Kleinfelder was retained by the Rappaport Companies to perform site characterization activities required by the Maryland Department of Environment (MDE) Voluntary Cleanup Program (VCP) for a 22 acre shopping center in District Heights, Maryland. The client was an inculpable person and was seeking to refinance the property to fund modifications. The property was assessed against residential standards (Tier II B land use) due to the presence of an on-site day care facility. Sub slab sampling was completed inside multiple tenant spaces for VOCs. Johnson & Ettinger modeling of the data was completed and it was determined that VOCs exceeded MDE risk levels. The results of the investigation indicated that indoor air sampling was required were compiled and submitted to the MDE VCP. The report and updated VCP application was accepted by the MDE without comment.

Task 4.0 Off-Site Access

Kleinfelder will pursue off-site access to the eleven (11) properties on Hillside Road to perform the vapor intrusion investigation. The activities to be completed to secure private property access will be as follows:

- Three documented attempts by telephone over a one-week period will be made.
- If no verbal response is received within one week of the last attempt, a certified letter will be sent.
- If no written response is received within two weeks of the submittal of the certified letter, DNREC will be contacted for possible aid in securing access and additional fees may be needed.

Once the access has been secured, the investigation activities will be coordinated.

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Task 5.0 Zone 1 (Facility) Vapor Intrusion Investigation

Kleinfelder proposes to complete four (4) soil vapor points to provide an initial assessment of vapor conditions at the facility. The proposed soil vapor points are depicted on **Figure 2** and actual locations may be modified in the field based on site conditions.

Prior to intrusive activities, Kleinfelder will contact Miss Utility to mark underground utilities. Kleinfelder will verify that the utilities are marked prior to the start of field activities. Kleinfelder personnel will mobilize a Delaware licensed drilling subcontractor to perform the installation of soil vapor probes using a track mounted geoprobe rig.

At each boring location, the direct-push method will be used to drive a disposable point to a depth of approximately 8 feet below grade. Once the appropriate depth has been reached, a 6-inch length of stainless steel screen connected to flexible Teflon tubing will be lowered to the bottom of the borehole through the center of the drilling rods. As probe rods are removed from the borehole, the stainless steel screen and associated tubing will remain in place at the desired depth. The end of the tubing protruding at land surface will be sealed until sampling is initiated.

The annulus around the screen and the one-foot interval above the screen will be backfilled with clean sand, followed by a three-foot interval of hydrated bentonite pellets placed on top of the sand. The remainder of the annulus will be backfilled to within one foot of land surface. The sampling point will be completed with a 5-inch diameter flush mount curb-box set in cement.

The soil vapor points will be allowed to stabilize for a minimum of 24 hours prior to sampling. The field sampling form provided in the DNREC-SIRB Vapor Intrusion Policy Attachment IV will be completed for each soil vapor point. Soil vapor sampling will then be performed utilizing the following procedural steps:

1. The sampling tubing will be connected to a 'T' connector three-way valve assembly, with one end of the 'T' connector leading to a vacuum pump and the other end leading to a pre-evacuated certified clean summa canister.

2. The soil vapor sample tubing will then be purged of approximately three volumes of the sample tubing and sand-filled annulus surrounding the screen using a vacuum pump set at a rate of approximately 0.2 liters per minute.

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3. A tracer gas (i.e., helium) will then be used to enrich the atmosphere in the immediate vicinity of the sampling location where the sampling tubing intersects the ground surface in order to test the borehole seal and verify that ambient air is not inadvertently drawn into the sample.

4. Following the purging and tracer gas verification steps, the valve leading to the pump will be closed, the pump will be turned off, and the soil vapor will be directed to the summa canister for sample collection, using the summa canister regulator to restrict the sample collection rate to 0.2 liters per minute or less.

5. Once the sample is collected, additional soil vapor will be extracted and screened with several gas meters for oxygen and carbon dioxide to assist in determining soil vapor conditions. Oxygen and carbon dioxide will be measured as percent volume using a multi-gas meter, calibrated daily with an appropriate multi-gas standard. During the completion of the fieldwork, the field screening data will be double-checked through the utilization of separate, redundant gas meters.

One ambient air sample will also be collected at land surface at the facility during the sampling event. These ambient air samples will be collected to better define the background atmospheric conditions within this area.

The soil vapor and ambient air samples will be analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method TO-15 and for methane using USEPA Method TO-3.

It has been assumed that the field work will be completed in two working days. The fees for laboratory analysis of up to 4 soil vapor and 1 ambient air samples have been included.

Task 6.0 Zone 2 (Residential) Vapor Intrusion Investigation

Kleinfelder proposes to complete 14 soil vapor monitoring points to assess if these properties are a source of petroleum hydrocarbons. The proposed soil borings are depicted on **Figure 2** and actual locations may be modified in the field based on site conditions. Two soil vapor points are proposed per single family residence in the upslope and front yards. This soil vapor point layout will provide coverage on three sides of each residence for the initial assessment.

Project Spotlight

Kleinfelder was retained by the Amerada Hess Corporation to perform a vapor intrusion investigation in Towson, Maryland. The investigation was required by the MDE Oil Control Program (OCP) downgraident of an active LUST project in a residential neighborhood with documented vapor complaints. Kleinfelder completed 18 soil borings for soil and groundwater sampling around 6 residences, completed basement surveys, sump water sampling, and data analysis. The results of the investigation indicated that contaminated groundwater was entering the residence basements through sumps, and French drains and volatilizing causing the odor complaints. Faulty drain traps were repaired, cracks repaired where necessary and the basement sumps were sealed and vented with small radon mitigation blowers.

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Prior to intrusive activities, Kleinfelder will contact Miss Utility to mark underground utilities at each residence. Kleinfelder will verify that the utilities are marked prior to the start of field activities. Kleinfelder personnel will mobilize a Delaware licensed drilling subcontractor to perform the installation of soil vapor probes using a track mounted geoprobe rig. At each boring location, hand tools or an equivalent direct-push method will be used to drive a disposable point to a depth of approximately 8 feet or, in the event the adjacent building basement slab is deeper than seven feet below grade, at least one foot lower than estimated depth of the basement slab. The construction and sampling of the soil vapor points will be in a similar manner to those described in Zone 1.

It has been assumed that the installation of the soil vapor points and sampling will be completed within 4 working days. For the purposes of the estimate, laboratory analysis of 14 soil vapor and 2 ambient air samples has been included.

Task 7.0 Zone 3 (Residential) Vapor Intrusion Investigation

Kleinfelder proposes to collect indoor air samples in the basement and first floor levels of the residences located at 9, 10, 11 and 12 Hillside Road. Prior to sampling, a detailed survey of the residence is recommended to identify background contaminant sources in the building. The Indoor Air Building Survey and Sampling form provided in the DNREC-SIRB Vapor Intrusion Policy Attachment IV will be completed for each residence.

Following completion of the pre-sampling surveys, potential interference from products or activities releasing volatile chemicals may need to be controlled. Removing the source from the indoor environment prior to testing may be required. Kleinfelder will inspect containers to ensure they are tightly sealed and containers will be tested with a photoionization detector (PID) to determine whether VOCs are leaking. The inability to eliminate potential interference may be justification for not testing, especially when testing for similar compounds at low levels. The residents will be instructed to operate the homes HVAC system under normal conditions.

For 24 hours prior to sampling, the residents will be advised to take all reasonable measures to avoid the following:

- Opening any windows, fireplace dampers, openings, or vents
- Operating ventilation fans unless special arrangements are made
- Smoking in the house
- Painting
- Using wood stoves, fireplaces or other auxiliary heating equipment (e.g., kerosene heaters)
- Operating or storing automobiles in an attached garage
- Allowing containers of gasoline or oil to remain within the house, except for fuel oil tanks

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- Cleaning, waxing, or polishing furniture or floors with petroleum- or oil-based products
- Using air fresheners or odor eliminators
- Engaging in any hobbies that use materials containing volatile organic chemicals
- Using cosmetics, including hairspray, nail polish, nail polish removers, perfume/cologne, etc.
- Applying pesticides

For the residences, Kleinfelder proposes to collect air samples from the basement, first floor living space, and from outdoors. Sample collection intakes will be located to approximate the breathing zone for building occupants (i.e., three feet above the floor level where occupants are normally seated or sleep). The air samples will be collected using pre-evacuated certified clean summa canisters using a regulator for a period of 24 hours. The indoor air and ambient air samples will be analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method TO-15 and for methane using USEPA Method TO-3.

One ambient air sample will also be collected at each residence during the indoor air sampling event to characterize site-specific outdoor air contaminants. The summa canister will be placed 5 feet above grade. Depending on building air exchange rates, contaminants from outdoor ambient air may make up a large percentage of indoor air contaminants.

Note that indoor air sampling is subject to background concentrations and seasonal variation.

It is assumed that the indoor air sampling activities will be completed in one event consisting of three mobilizations: (1) pre-sampling survey (2) indoor air sampling setup and (3) sample pickup after 24 hours. The fees for laboratory analysis of 8 indoor air samples (two per residence) and 4 ambient air samples are included.

Task 8.0 Data Analysis and Reporting

Kleinfelder will prepare a Vapor Investigation and Health Risk Assessment Report for submission to DNREC following receipt of the laboratory analytical results for the vapor samples. The report will include a summary of vapor intrusion investigation methods for each zone and results and an assessment of the contaminants of concern (COCs) and QA/QC data. Data interpretation will include a discussion on the Conceptual Site Model (CSM), results of J&E modeling for Zones 1 and 2, and risk calculations and assumptions for each zone. The report will include recommendations for each zone such as further investigation, institutional controls, or mitigation. The report will contain the appropriate figures, tables, and appendices.

Fees have been included for one meeting with DNREC –TMB to review the draft report. Additionally, fees have been included in this task for the submission of letter reports to the property owners conveying the results of their soil vapor or indoor air sampling results.

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SECTION 5.0 PROPOSED PROJECT TEAM

Our qualifications to provide outstanding professional consulting services are derived from our staff's education, training and diverse experience in unison with the number and types of projects completed by the firm. The value of the Kleinfelder team's expertise is widely recognized and advantageously used by hundreds of Clients to overcome numerous and complex regulatory hurdles.

We understand your needs – safe implementation, quality field work and data collection, schedules and budgets, and minimize disruption to the public. The Kleinfelder team's personnel and leadership are fully able to commit resources as necessary to facilitate project demands.

Proposed Delivery Methodology . . . Work resulting from this potential contract will be managed from Kleinfelder's Hanover, Maryland office. **Mr. Mark Steele, the proposed project manager**, will be the DNREC primary point-of-contact. Mr. Steele will work with **Dr. Scott Dwyer and Apurva Patil** to deliver a quality technically sound project. Dr. Dwyer, a Kleinfelder principal professional, will provide senior level support, review and quality assurance of the investigation plans and final report to DNREC and the project team. Ms. Patil will provide technical support and complete the risk assessment for the project. A description of each key staff's roles and experience for this potential contract is next.

Mark Steele will serve as the Project Manager, focusing on the overall direction, coordination and administration of the contract. Mr. Steele will be responsible for the overall stewardship and compliance of contract requirements; and will be the primary point of contact with DNREC. He will ensure delivery of high quality work products through the application of fundamental science and engineering concepts; maintain the budget and schedule; and oversee daily technical communications. Mr. Steele also will prepare and submit project progress reports as required; direct and interface with subcontractors; and liaison with Kleinfelder's Health and Safety and Quality Assurance Mangers.

Mr. Steele is an experienced project manager in supporting site assessment and remediation projects for petroleum release sites. Through his 10 plus years in the environmental consulting, Mr. Steele has acquired a broad range of project experience ranging from preliminary site evaluations, UST closures, and RBCA to comprehensive subsurface investigations under state environmental regulatory programs.

Mark Steele has a Bachelor of Arts in Biology and Chemistry and a Master's in Science in Environmental Science. He has OSHA 40-Hour HAZWOPER, Loss Prevention System training, and is a District of Columbia Certified Risk Assessor. In addition to his responsibilities at Kleinfelder, he is a member of the Maryland Chapter of the National Brownfields Association Technical Committee, and the Baltimore Chapters of the Urban Land Institute and US Green Building Council.

Dr. Scott Dwyer is a toxicologist and will provide senior technical review and quality assurance for this project. Dr. Dwyer specializes in the application of toxicology and risk analysis techniques to human health risk assessment, to compliance with regulatory agency guidelines and standards. He has served as the project/task manager on risk assessments performed under CERCLA, RCRA, and state guidelines. Dr. Dwyer has also provided expert testimony and litigation support on behalf of the U.S. Department of Justice, local governments, and private clients. Dr. Dwyer has been the senior author or co-author of more than 200 client-funded risk assessment and toxicology reports.

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Dr. Dwyer has Bachelor of Science degree in Biological Sciences, Masters in Pharmacology/Toxicology and a Doctorate in Pharmacology. He is a member of the Society of Toxicology, Society for Risk Analysis, Society of Environmental Toxicology and Chemistry (SETAC), American Industrial Hygiene Association, Member Toxicology Committee, and American Society for Testing and Materials E50.02 (Vapor Intrusion Task Force)

Ms. Patil will provide technical support and will complete the data evaluation and risk assessment for the project. Mr. Patil has over 13 years experience in conducting environmental site assessments and risk assessment evaluations for petroleum release sites in Delaware, District of Columbia, and Maryland. She is skilled in the application of RBCA, vapor intrusion investigations and use of J&E models.

Ms. Patil has a Bachelor of Science degree in Civil Engineering and a Masters in Environmental Engineering. She is an Engineer In Training (EIT) and a District of Columbia Certified Risk Assessor. She has OSHA 40 HAZWOPER and Loss Prevention System training.

Mr. Shedd is a project scientist and will provide field support and data collection activities for the proposed project. Mr., Shedd has 3 years experience in conducting environmental site assessments from field data collection to reporting. He is skilled in risk assessment; soil vapor sampling and vapor intrusion modeling; well design, installation, and construction; geophysical assessment and analysis; and groundwater modeling.

Mr. Shedd has a Bachelor of Science in Water Resources. He has OSHA 40-Hour HAZWOPER and Loss Prevention System training and is a member of the National Groundwater Association and American Association of Engineering Geologists.

Resumes of the proposed team members are attached.

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SECTION 6.0 COMPENSATION AND SCHEDULE

Kleinfelder proposes to provide the basic services listed in this proposal on a time and materials basis for an **estimated not to exceed fee of $59,400**. Please see the table below for a summary of the fees per task and the attached estimate for a detailed breakdown of fees. This fee is estimated based on the scope of work and the assumptions and limitations detailed in this proposal. We anticipate that activities listed will be completed in the time periods listed in Table 2 below.

Table 2 – Fee and Schedule

Task	Estimated Fee	Time Period
Quarterly Sampling and Reporting	$10,600	March 2009 – March 2010
Public Meeting	$4,100	March 2009
Off-Site Access	$3,000	April 2009
Zone 1 (Facility) Investigation	$5,700	May 2009
Zone 2 (Residential) Investigation	$17,800	May 2009
Zone 3 (Residential) Indoor Air Sampling	$7,200	May 2009
Data Analysis and Reporting	$9,000	June – July 2009
Project Coordination	$2,000	March – July 2009

The proposal fees are based on initial data provided by DNREC and the scope of work provided herein. An updated fee proposal may be required if the scope of work is significantly modified following the public meeting.

This fee is estimated based on the scope of work and the assumptions and limitations detailed in this proposal. Changed conditions may require modification to the scope and additional fee for the project.

This amount will not be exceeded without prior approval. DNREC and Kleinfelder may subsequently agree in writing to provide for additional services to be rendered under this agreement for additional, negotiated compensation.

Kleinfelder will begin the stated scope of work within 5 days from receipt of a DNREC purchase order (PO) to proceed.

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SECTION 7.0 LIMITATIONS

Our work will be performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations will be based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This proposal is valid for a period of 90 days from the date of this proposal, unless a longer period is specifically required by the RFP in which case that time frame will apply. This proposal was prepared specifically for the client and its designated representatives and may not be provided to others without Kleinfelder's express permission.

Regulations and professional standards applicable to Kleinfelder's engineering services are continually evolving. Techniques are, by necessity, often new and relatively untried. Different professionals may reasonably adopt different approaches to similar problems. As such, our services are intended to provide DNREC with a source of professional advice, opinions and recommendations based on our limited number of field observations and tests, collected and performed in accordance with the generally accepted engineering practice that exists at the time our services are rendered and may depend on, and be qualified by, information gathered previously by others and provided to Kleinfelder by DNREC.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. Although risk can never be eliminated, more detailed and extensive studies will yield more information, which may help understand and manage the level of risk involved. 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 could be performed to reduce these uncertainties.

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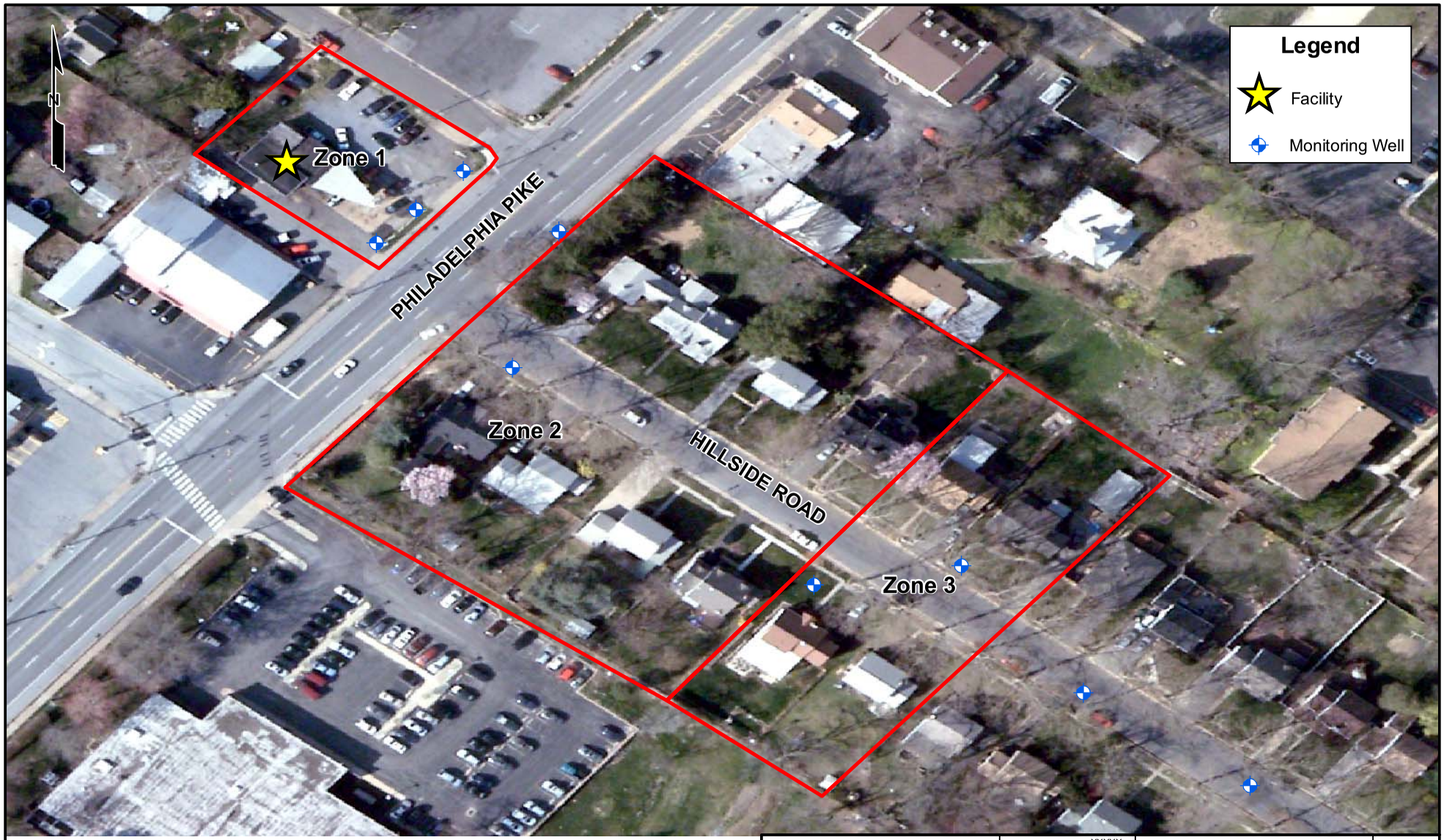

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0 35 70 140 Feet

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PROJECT NO.	XXXXX
DRAWN:	01/23/09
DRAWN BY:	AJP
CHECKED BY:	MCS
FILE NAME:	Claymont DE Local Area Map 012209.mxd

AREA MAP

FACILITY ID: 3-000712
RON'S DISCOUNT ENERGY MART
2509 PHILADELPHIA PIKE
CLAYMONT, DE

FIGURE

1

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0 35 70 140 Feet

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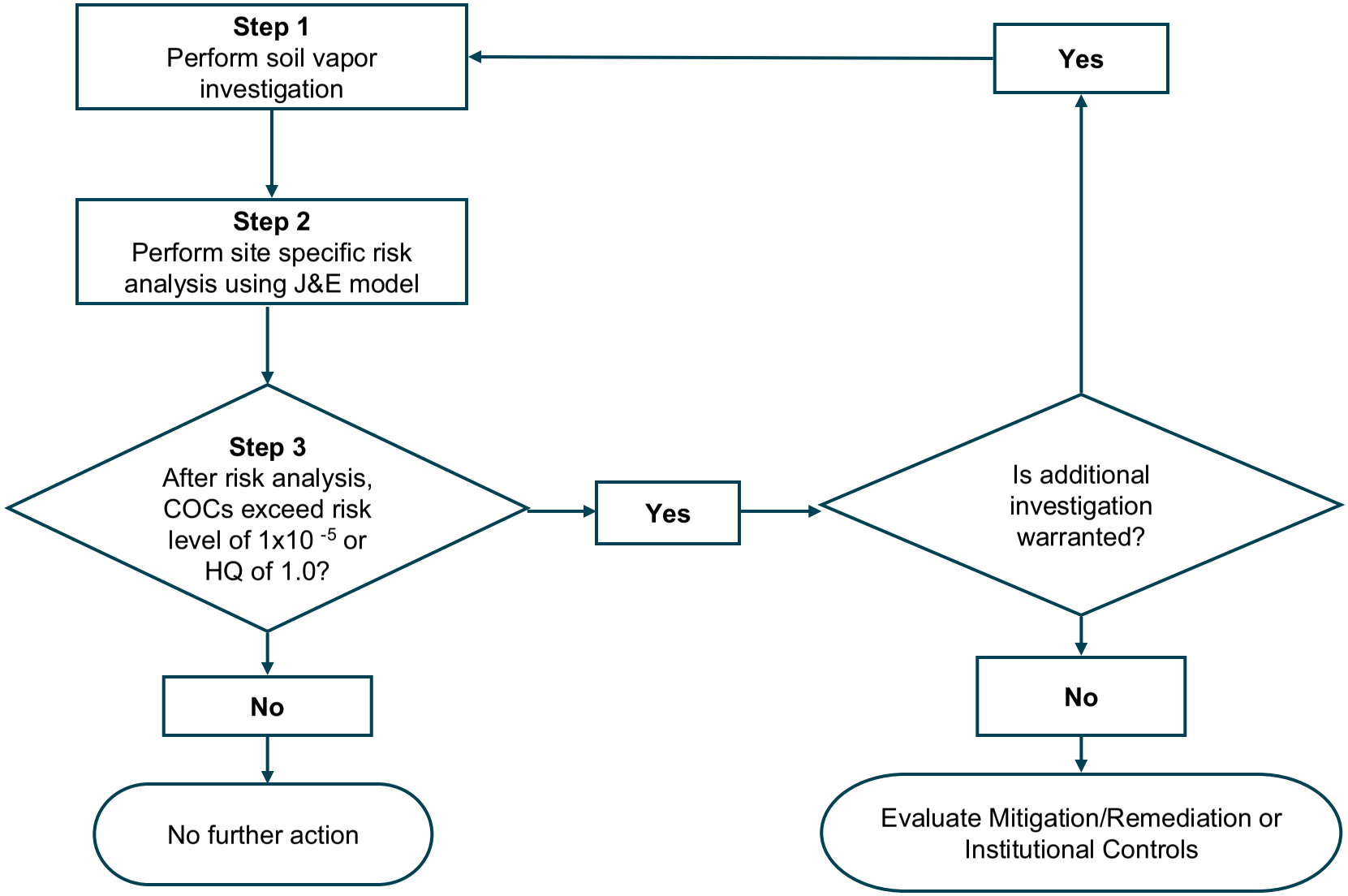
PROJECT NO.	XXXXX
DRAWN:	01/23/09
DRAWN BY:	AJP
CHECKED BY:	MCS
FILE NAME:	Claymont DE Prop SVP Map 012209.mxd

PROPOSED SOIL VAPOR POINT LOCATION PLAN

FACILITY ID: 3-000712
RON'S DISCOUNT ENERGY MART
2509 PHILADELPHIA PIKE
CLAYMONT, DE

FIGURE
2

Zone 1
Decision Making Flow Chart for Evaluation of Vapor Intrusion Pathway



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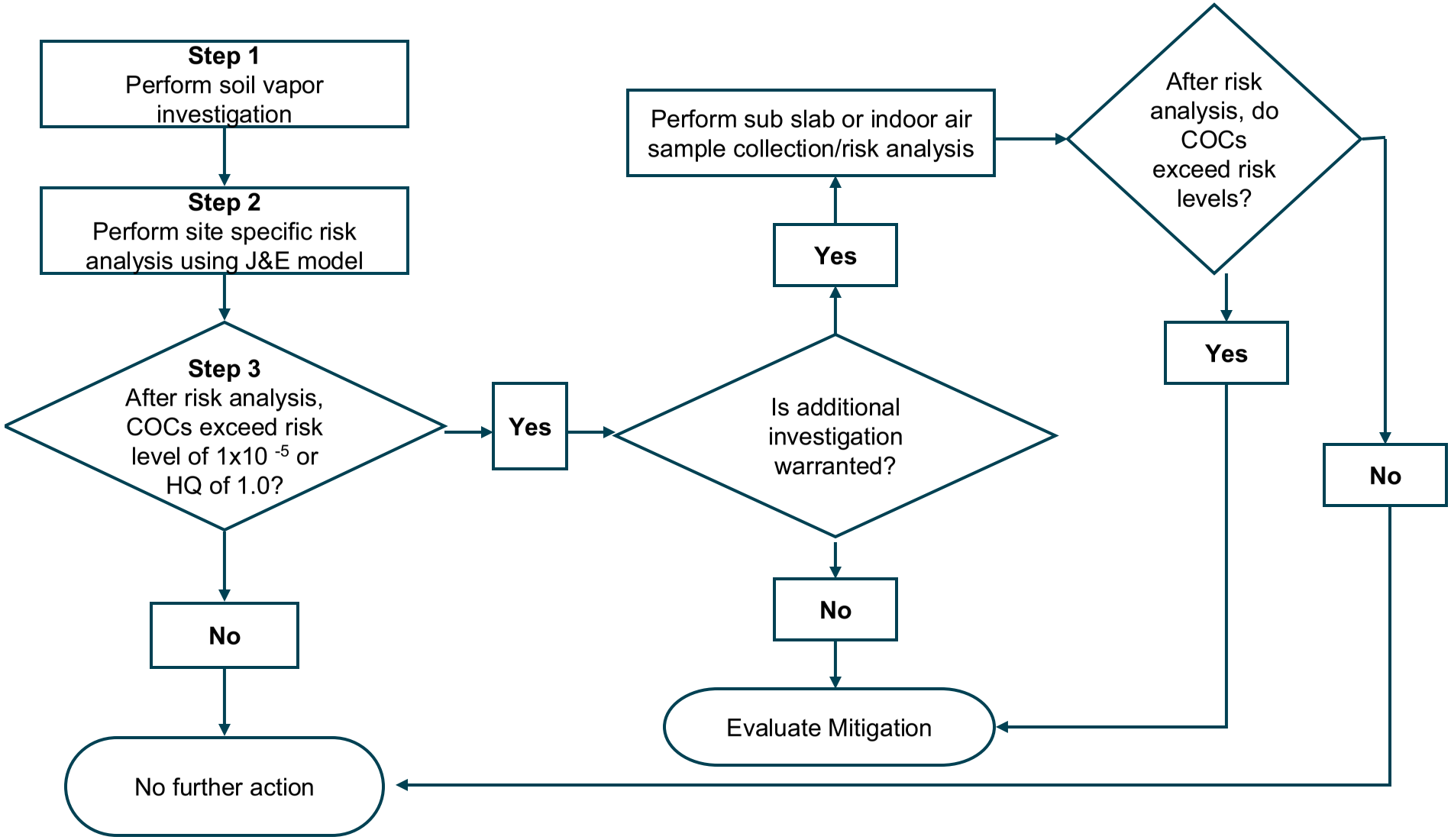
Zone 2
Decision Making Flow Chart for Evaluation of Vapor Intrusion Pathway



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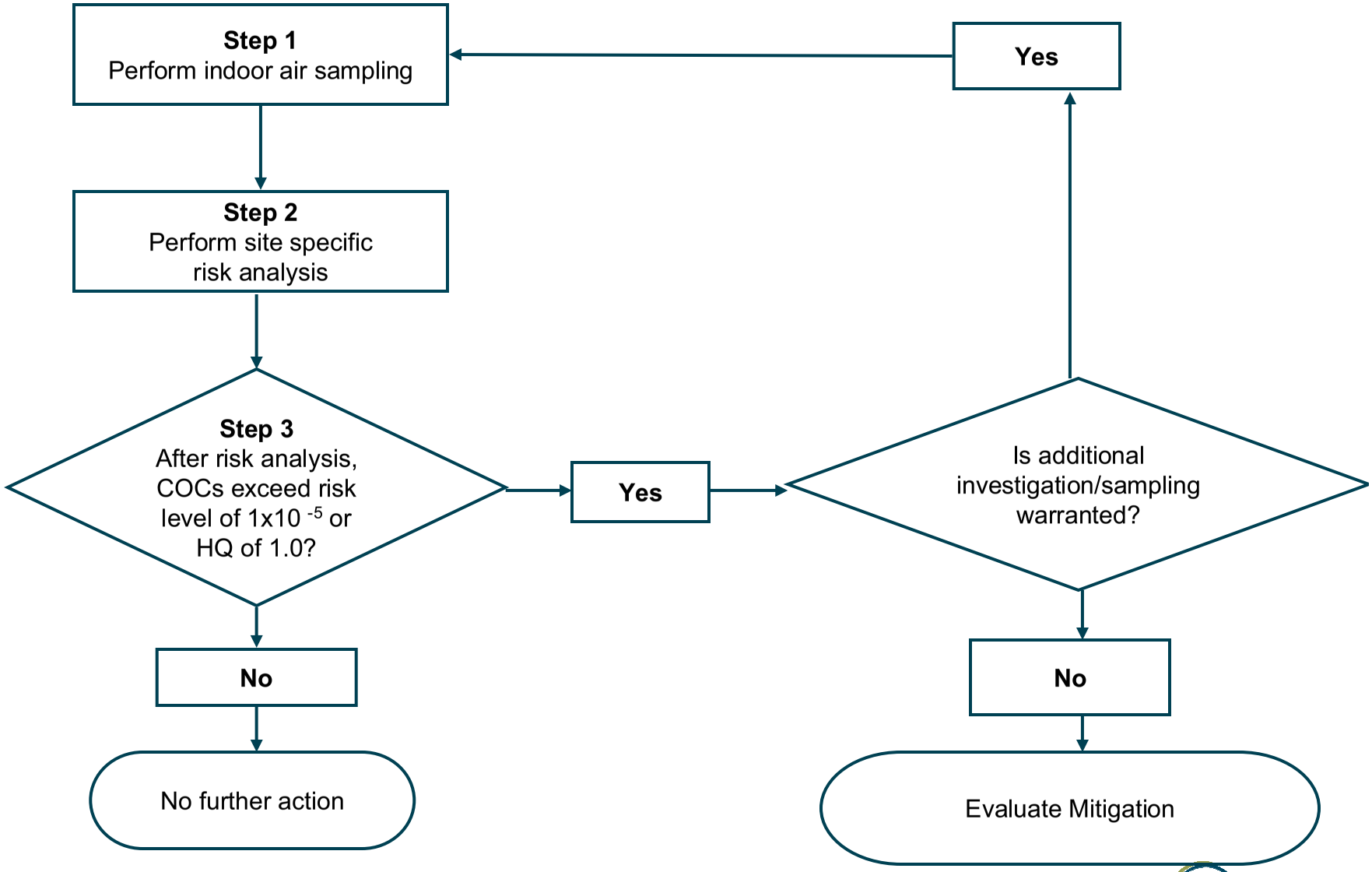
Zone 3
Decision Making Flow Chart for Evaluation of Vapor Intrusion Pathway



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Project Name: ExxonMobil Jacksonville

Project Location: 14258 Jarrettsville Pike, Phoenix, MD

Nature/Type: Emergency Response, Environmental Site Investigation, Remediation

Cost/Fee for Services: $22,000,000 **Project Status:** On-Going

Project Description:

Kleinfelder was contracted to oversee assessment and recovery efforts in response to a catastrophic gasoline release in early 2006. The release occurred in a fractured bedrock environment with local residents relying on potable wells for drinking water. Therefore, effective early decision making and mitigation action was paramount for to the success of this project. Kleinfelder personnel were onsite within an hour of the client's request, and since then, Kleinfelder has been at the site providing assessment and remediation activities.

Kleinfelder is providing technical direction on and oversight of assessment and remediation activities, operating and maintaining ten active remediation systems which recover and treat groundwater and soil vapor from up to 90 wells on 15 different properties, supervising site improvement and construction activities, monitoring over 230 monitoring wells, 220 potable wells, and 20 soil vapor points within a half-mile radius, regulatory reporting, providing legal and permitting support, and assisting with public hearings.

Client Benefits

- Rapid response and mobilization of significant resources within hours
- Effective management of the client liabilities
- Knowledge and experience allows intelligent regulatory negotiation
- Millions of dollars in savings to the client from value added services
- Safe execution of the work – almost 500,000 man hours worked

Project Name: Smith Center for Performing Arts

Project Location: Las Vegas, NV

Nature/Type: Soil Vapor Investigation, Risk Assessment, Vapor Mitigation

Cost/Fee for Services: $100,000 **Project Status:** Completed June 2007

Project Description:

Kleinfelder developed a soil vapor investigation plan and prepared a health risk assessment for the proposed site of the Smith Center for the Performing Arts, a world class theater funded by the largest private donation in Nevada history. The proposed site is in the Union Park development, a 61-acre parcel in downtown Las Vegas formerly used as a rail yard by the Union Pacific Railroad. The site is known to be contaminated by petroleum hydrocarbons and chlorinated solvents. Based on an exposure pathways analysis, Kleinfelder concluded that vapor migration into the proposed theater was the only complete exposure pathway and, therefore, recommended a soil vapor investigation and health risk assessment to address the potential health hazards for theater complex employees and patrons. Based on the results of the health risk assessment, Kleinfelder recommended the installation of a vapor mitigation system to prevent the high concentrations of chlorinated solvents detected in soil vapor from migrating into the theater complex. The vapor mitigation system will protect occupants of the building while limiting the remedial action costs necessary to re-use this valuable property.

Client Benefits

- Risk assessment and vapor mitigation system allowed redevelopment for rail yard
- Effective management of the client liabilities
- Significant savings to the client from value added services

Project Name: Former JC Penney Auto Center

Project Location: Sacramento, CA

Nature/Type: Soil Vapor Investigation, Risk Assessment

Cost/Fee for Services: $64,000 **Project Status:** Completed July 2008

Project Description:

A petroleum hydrocarbon (benzene) groundwater plume was located on a former JC Penney Auto Center property and had migrated under the former footprint of a JC Penney retail store on the subject site. A second plume of the chlorinated solvent, PCE, possibly related to a former dry cleaner, was located downgradient of the property. Depth to groundwater was approximately 50 feet below grade. The site was regulated by the Central Valley Regional Water Quality Control Board (CVRWQCB) and the Sacramento County Environmental Management Department (SCEMD). A Fortune 500 retail company was planning to construct a 150,000 square foot retail space over the former footprint of the JC Penney retail store but was required by the Water Board to address the potential for vapor intrusion before construction could proceed.

Kleinfelder prepared a soil gas investigation work plan that called for 30 soil gas samples collected from 15 locations, two depths (five and 15 feet) at each location. The samples were to be analyzed by US EPA Method TO-15 for volatile organic compounds (VOCs). The Water Board approved Kleinfelder's approach and work plan within two weeks of receipt based on a pre-arranged rapid review commitment to support the client's tight construction schedule. Soil gas analytical results were first compared to regulatory screening levels (California Human Health Screening Levels, Water Board Environmental Screening Levels, and EPA target soil gas screening levels). Two chemicals, benzene and 1,3-butadiene, exceeded screening values. The Johnson and Ettinger model for the evaluation of vapor migration into buildings was used to estimate potential indoor air concentrations of VOCs. Based on the Johnson and Ettinger modeling and site-specific information gathered from architectural plans and the building engineer's HVAC design, Kleinfelder demonstrated that potential indoor air concentrations of the chemicals of concern would not exceed regulatory limits for cancer risk and noncancer hazard. The Water Board concurred with Kleinfelder's health risk evaluation and provided a regulatory closure letter indicating that no further action was necessary to address vapor intrusion into the proposed retail building.

Client Benefits

- Regulatory closure granted
- Effective management of the client liabilities
- Significant savings to the client from avoiding installation of vapor mitigation system

MARK STEELE

Senior Project Manager

Education

- BA, Environmental Biology, Western Maryland College
- MS, Environmental Science, Ball State University

Training / Certifications

- OSHA HazWoper
- DC Risk Assessor
- MD UST Remover
- MD Public Water System Sampler
- AHERA Asbestos Inspector
- OH Lead Inspector and Risk Assessor
- Risk Based Corrective Action Applied at Petroleum Release Sites (ASTM Standard E 1739)
- Risk Based Decision-Making for Petroleum Releases at Underground Storage Tank Sites
- Air Sparging for Site Remediation
- Loss Prevention System

Professional Affiliations

- National Brownfields Association
- Urban Land Institute
- US Green Building Council
- National Ground Water Association (NGWA)

Summary of Experience

Mr. Steele has more than ten years of experience in site investigation, pilot testing, design, implementation and operation of remedial solutions, including *ex-situ* and *in-situ* remedial technologies. His professional experience includes program and project management of site assessment and remediation projects including petroleum at commercial facilities, terminals, and manufacturing facilities in DE, DC, MD, NC, NH, PA, SC, and VA. Mr. Steele's responsibilities include program and project management and providing technical direction and oversight on site assessment, aquifer characterization, remedial investigation, feasibility studies, remedial design engineering, oversight of remediation system operations and maintenance, risk-based corrective action, client and regulatory coordination and permit compliance. Mr. Steele has experience implementing innovative assessment techniques include rotosonic drilling, Membrane Interface Probe System (MIPS), NAPL FLUTe liners, FLUTe wells, and stable carbon isotope analysis for MTBE degradation, and remediation techniques including *in-situ* chemical oxidation. Mr. Steele has extensive experience managing projects with potable wells impacted by dissolved phase hydrocarbons including installation and operation of point of entry treatment systems, deep and double cased well replacement, and connection to public water supplies. He is also responsible for the review and technical quality of hydrogeologic investigation and remediation work scopes and plans, corrective action plans (CAP), progress reports and requests for no further action, staff development and subcontractor supervision, safety, and long-term project budgets including cost to objective and cost to closure.

Mr. Steele is currently the Assessment and Remediation Leader for the Maryland office. His responsibilities include leadership and guidance to environmental projects in the Mid-Atlantic including DC, DE, MD, NC, and VA. He works closely with his colleagues to provide technical guidance and expertise in guiding successful planning and task execution. He manages the phases of site assessment and remediation with project scopes of work ranging from assessment, remedial investigations, feasibility testing, CAP development, system design, permitting, installation, startup, O&M and shutdown, Tier I and II RBCA, site divestments and UST system closure, reporting and NFA requests.

DR. SCOTT DWYER
Toxocologist

Education

- PhD, Pharmacology, University of Alabama, Birmingham, 1989
- MS, Pharmacology/Toxicology, Washington State University, Pullman, 1985
- BS, General Studies/Biol Sci, Washington State University, Pullman, 1983
- BA, History, Washington State University, Pullman, 1982

- ***Registrations***

- Diplomate of the American Board of Toxicology (DABT)

- ***Professional Affiliations***
- Society for Risk Analysis
- Society of Toxicology (full member)
- American Industrial Hygiene Association, Toxicology Committee
- Society for Environmental Toxicology and Chemistry

Summary of Experience

Dr. Dwyer specializes in the application of toxicology and risk analysis techniques to human health risk assessment, to compliance with regulatory agency guidelines and standards. He has served as the project/task manager on risk assessments performed under CERCLA, RCRA, and state guidelines. Dr. Dwyer has also provided expert testimony and litigation support on behalf of the U.S. Department of Justice, local governments, and private clients. Dr. Dwyer has been the senior author or co-author of more than 200 client-funded risk assessment and toxicology reports. This work has encompassed screening-level and baseline human health risk assessments in Washington, California, Oregon, Idaho, Montana, Utah, Nevada, Arizona, Alaska, Georgia, South Carolina, Alabama, and Mississippi. These risk assessments have included evaluations of risk associated with chemicals released to air, soil, and surface and ground water.

Selected Relevant Experience

Preparation of the ASTM Standard Practice for Assessment of Vapor Intrusion into Structures on Property Involved in Real Estate Transactions (E 2600-08). Dr. Dwyer co-authored the vapor mitigation section of the new ASTM vapor intrusion standard for real estate transactions. The preparation of this section involved the review and evaluation of several mitigation approaches that included institutional and engineering controls. This work also involved regular participation in meetings and discussions with the vapor intrusion task force that prepared the new ASTM standard.

Smith Center for the Performing Arts, Las Vegas, Nevada. Developed a soil vapor investigation plan and prepared a health risk assessment for the proposed site of the Smith Center for the Performing Arts, a world class theater funded by the largest private donation in Nevada history. The proposed site is in the Union Park development, a 61-acre parcel in downtown Las Vegas formerly used as a rail yard by the Union Pacific Railroad. The site is known to be contaminated by petroleum hydrocarbons and chlorinated solvents. Based on an exposure pathways analysis, vapor migration into the proposed theater was the only complete exposure pathway and, therefore, a soil vapor investigation and health risk assessment were proposed to address the potential health hazards for theater complex employees and patrons. Based on the results of the health risk assessment, installation of a vapor mitigation system was proposed to prevent the high concentrations of chlorinated solvents detected in soil vapor from migrating into the theater complex. The vapor mitigation system will protect occupants of the building while limiting the remedial action costs necessary to re-use this valuable property. Design of the vapor mitigation system is underway.

Soil Vapor Survey and Health Screening Evaluation, Former JC Penney Auto Center, Sacramento, California. A Fortune 500 retail company was planning to construct a 150,000 square foot retail space over the former footprint of a JC Penney retail store but was required by the Water Board to address the potential for vapor intrusion before construction could proceed. Site investigation information indicated that a petroleum hydrocarbon (benzene) groundwater plume was located under the footprint of the proposed building.

The site was regulated by the Central Valley Regional Water Quality Control Board (CVRWQCB) and the Sacramento County Environmental Management Department (SCEMD). Dr. Dwyer co-authored the soil vapor investigation work plan that called for 30 soil vapor samples collected from 15 locations, two depths (five and 15 feet) at each location. The samples were to be analyzed by US EPA Method TO-15 for volatile organic compounds (VOCs). The Water Board approved Kleinfelder's approach and work plan within two weeks of receipt based on a pre-arranged rapid review commitment to support the client's tight construction schedule. Dr. Dwyer first compared soil vapor analytical results to regulatory screening levels (California Human Health Screening Levels, Water Board Environmental Screening Levels, and EPA target soil gas screening levels). Two chemicals, benzene and 1,3-butadiene, exceeded screening values. Therefore, the Johnson and Ettinger model for the evaluation of vapor migration into buildings was used to estimate potential indoor air concentrations of VOCs. Based on the Johnson and Ettinger modeling and site-specific information gathered from architectural plans and the building engineer's HVAC design, Dr. Dwyer demonstrated that potential indoor air concentrations of the chemicals of concern would not exceed regulatory limits for cancer risk and noncancer hazard. The Water Board concurred with Kleinfelder's health risk evaluation and provided a regulatory closure letter indicating that no further action was necessary to address vapor intrusion into the proposed retail building.

Soil Vapor and Indoor Air Survey and Health Screening Evaluation, A&M Market, Stratford, California. Prepared a soil vapor and indoor air survey work plan to provide the data necessary for a health screening evaluation of a former retail service station re-developed for commercial use as a neighborhood market. The chemicals of concern included benzene, ethylbenzene, toluene, xylenes, and the volatile organic lead species: tetraethyl and tetramethyl lead. The California Regional Water Quality Control Board (Water Board), Central Valley Region, approved the survey approach and work plan. Based on the results of the soil vapor and indoor air survey, a health screening evaluation and concluded that under current site conditions, an unacceptable health hazard did not exist and that further investigation or remediation were not necessary. The Water Board concurred with this conclusion and issued a No Further Action letter for regulatory closure.

Vapor Migration Modeling and Human Health Risk Assessment, South Shore Shopping Center, Alameda, California. Dr. Dwyer performed a human health risk assessment of indoor air concentrations of chemicals in two retail dry cleaning operations at the South Shore Shopping Center in Alameda, California. The chemicals of concern (primarily tetrachloroethene) may have been present in the indoor air due to the use and storage of dry cleaning materials during normal operations or due to subsurface releases of these chemicals that later migrated as vapors from soil or groundwater to indoor air. Health hazards were evaluated under current and future occupational exposure conditions based on OSHA and NIOSH exposure limits, and based on California Office of Environmental Health Hazards Assessment (OEHHA) "No Significant Risk Levels." Vapor migration modeling was performed using the EPA and DTSC approved Johnson and Ettinger model. The objective of the vapor migration modeling and risk assessment was to support future land use evaluations by the property owner and to evaluate worker safety under current conditions.

Former Pepsi Distribution Plant, Ogden, Utah. Dr. Dwyer performed a human health risk assessment for parties responsible for a plume of PCE, TCE, and other chlorinated solvents that originated from a former distribution plant and had migrated under an adjacent residential area. The specific goals of the risk assessment were to support a request to discontinue groundwater monitoring and to demonstrate that the groundwater plume would not reach surface water. Domestic use of groundwater was eliminated as an exposure pathway of concern based on a well survey that showed no existing domestic supply wells in the study area. The Johnson and Ettinger model for subsurface vapor transport was used to estimate indoor air concentrations of the chemicals of concern and to estimate cancer risk and noncancer hazard. A survey of the design of the homes in the area was performed to identify those constructed with basements and those with slab-on-grade foundations. Because approximately half of the homes had basements, the vapor migration model was set up to evaluate homes with basements.

The results of the risk assessment demonstrated that groundwater concentrations of PCE, TCE, and the other chlorinated solvents had declined over time and that vapor migration to indoor air did not yield a cancer risk exceeding 1×10^{-6} or a noncancer hazard of 1.0. The responsible parties proposed, and the Utah Department of Environmental Quality agreed, that groundwater monitoring could be discontinued, saving the client thousands of dollars in annual groundwater monitoring costs.

Tooele Army Depot, U.S. Army Corps of Engineers, Tooele, Utah. Dr. Dwyer performed a baseline human health risk assessment for the Tooele Army Depot (TEAD) to support the optimization of the on-going groundwater treatment system and to support the implementation of an alternative cleanup level for trichloroethene (TCE), which was present in the groundwater at concentrations that exceed the Maximum Contaminant Level (MCL) at some monitoring well locations.

TCE and chloroform were the primary chemicals of concern. For these and a handful of other VOCs, three human health exposure scenarios based on various subsets of monitoring well data were evaluated. Two of the scenarios were focused on residential exposures, including water ingestion, dermal absorption, and inhalation of vapors during bathing. The third scenario was focused on an industrial exposure scenario and included an evaluation of water ingestion and dermal contact.

The results of the risk assessment and the toxicological information available for TCE supported the conclusion that an alternative cleanup level significantly greater than the MCL of 5 ug/L was appropriate and health-protective. The risk assessment also supported recommendations for treatment system modifications that would save the Army Corps of Engineers approximately $20 million in operating costs over the life of the remediation effort.

Human Health Risk Assessment of Stringfellow Perchlorate Plume; Glen Avon, California—California Environmental Protection Agency, Department of Toxic Substances Control. Dr. Dwyer is leading the preparation of the human health risk assessment for the Stringfellow site, a Superfund site for which the State of California is the lead regulatory agency. This is the site of one of the largest perchlorate plumes in the United States. The 17-acre Stringfellow Site was operated from 1956 until 1972 as a hazardous waste disposal facility. More than 34 million gallons of industrial waste were placed in evaporation ponds located at the site during this period. The wastes consisted primarily of metal finishing products, electroplating materials, and pesticides. During the operational period of the facility, a spray evaporation process was used to reduce the volume of wastes accumulating in the ponds. Heavy rainfall caused the disposal ponds at the site to overflow in 1969, resulting in a discharge of contamination into Pyrite Creek. In 1978, heavy rains again threatened to cause the ponds to overflow and the California Regional Water Quality Control Board (RWQCB) authorized an 800,000-gallon wastewater release to prevent a massive uncontrolled release. Between 1975 and 1980, approximately 6.3 million gallons of liquid wastes and contaminated materials were removed from the site and transported to a federally approved disposal facility.

The health risk assessment that Dr. Dwyer is leading the preparation of is being performed as part of the Remedial Investigation/Feasibility Study (RI/FS) project for the perchlorate in groundwater in the community area (Zone 4) of the Stringfellow site.

Human Health and Ecological Risk Assessments for Six Installation Restoration Program (IRP) Sites, Space and Naval Warfare Systems Center (SPAWAR); Point Loma Naval Complex, San Diego, California—Dr. Dwyer is the task manager and technical lead for the development of six human health and ecological risk assessments being performed at the SPAWAR facility on Point Loma in San Diego, California. The six sites have supported various naval operations including a plating and sandblasting shop, re-fueling, and sewage disposal. The contaminants of concern include metals (e.g., arsenic, beryllium, cadmium), volatile organic compounds, pesticides, PCBs, and PAHs. The primary exposure pathways of concern include soil ingestion, inhalation of soil particulates, and direct dermal contact for humans and other animals, as well as uptake of contaminants by plants. The project team is also evaluating the potential for leaching of contaminants to groundwater and transport to the Pacific Ocean located within 0.25 miles of each of the sites. The risk assessment reports are now under review at the State of California Department of Toxic Substances Control.

Publications

Dwyer SD. Toxicology of Gases. In: *Toxicology Principles for the Industrial Hygienist*. Luttrell WE, Jederberg WW, Still KR, eds. Fairfax, VA: AIHA Press; 2008.

Dwyer SD. Development of a Method for Facility Siting Risk Analysis: A Case Study. In: *Computational Models of Risks to Infrastructure.* Skanata D, Byrd DM, eds. Amsterdam: IOS Press; 2007:145-158

Dwyer S.D., Galloway R.L., 1997. New Washington State Policy for Setting Cleanup Levels at Petroleum Release Sites. Environmental Regulation and Permitting 7(1):73-76.

With S. Richards, D. Lincoln, and A. Silvers. 1993. Probabilistic Health Risk Analysis of Proposed PCB Soil Cleanup Standards (Abstract). The Toxicologist 13:275.

With D. Lincoln and A. Silvers. 1992. Probabilistic Exposure Assessment Using a Monte Carlo-based Model (Abstract). The Toxicologist 12:98.

With Y. Zhuang and J.B. Smith. 1991. Calcium Mobilization by Cadmium or Decreasing Extracellular Na+ or pH in Coronary Endothelial Cells. Exp. Cell Res. 192:22-31.

With E. Michaelenko. 1990. Toxicological Profile for 1,3-Dichloropropene. Prepared for the Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, Atlanta, Georgia.

With W. Meylan and S. Coleman. 1990. Health and Environmental Effects Document on Formaldehyde. Prepared for the Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, Ohio.

With D. Basu and S. Coleman. 1990. Health and Environmental Effects Document on Hydrazine. Prepared for the Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, Ohio.

With J. Tunkel. 1989. Toxicological Profile for 2-Butanone (Methyl ethyl ketone). Prepared for the Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, Atlanta, Georgia.

With J.B. Smith and L. Smith. 1989. Decreasing Extracellular Na+ concentration Triggers Inositol Polyphosphate Production and Ca2+ Mobilization. J. Biol. Chem. 264:831-837.

With J.B. Smith and L. Smith. 1989. Cadmium Evokes Inositol Polyphosphate Formation and Calcium Mobilization: Evidence for a Cell Surface Receptor that Cadmium Stimulates and Zinc Antagonizes. J. Biol. Chem. 264:7115-7118.

With J.B. Smith and L. Smith. 1989. Lowering Extracellular pH Triggers Inositol Lipid Hydrolysis and Calcium Mobilization. J. Biol. Chem. 264:8723-8728.

With K.M. Meyers. 1986. Rat Platelet Aggregation: Strain and Stock Variations. Thromb. Res. 42:49-56.

With K.M. Meyers. 1986. Anesthetics and Anticoagulants Used in the Preparation of Rat Platelet-Rich-Plasma Alter Rat Platelet Aggregation. Thromb. Res. 42:139-149

APURVA PATIL

Project Engineer

Education

- M.S., Environmental Engineering, Wayne State University, Detroit, MI, 04/02; B.E., Civil Engineering, Bombay University, India, 05/92

Registrations

- E.I.T., Civil, Ohio

Training/Certifications

- OSHA 40-Hr. Hazardous Waste Training
- District of Columbia Risk Based Corrective Action for Petroleum Releases at Underground Storage Tank Sites by Risk Assessment and Management Group, Inc., Houston, TX

Summary of Experience

Apurva has thirteen years of experience in both the project management and environmental consulting industry. Apurva has site-specific experience in conducting hydrogeologic investigations, performing site-specific risk assessments for sites contaminated with petroleum contaminants, feasibility testing, and developing a site conceptual model before full-scale remediation and ground water modeling tasks are implemented. She has evaluated petroleum contaminated sites for implementing practical environmental solutions and to meet the regulatory standards to include groundwater resource management, site assessments, baseline risk assessments for human health and environment and designing remedial solutions, system installations, operations and maintenance, and use risk based closure approach to close the contaminated site. She has thorough knowledge and understanding of risk based corrective action (RBCA) program for DC, DE, MD, and OH. She has conducted pilot tests for designing the remediation systems. She has expertise in using groundwater models RBCA Toolkit Chemical Release (including DERBCAP Module), BIOSCREEN, Sesoil, Vleach, Johnson & Ettinger. Apurva has conducted soil vapor sampling and interpreted soil vapor analytical data based on API guidance document. Apurva has managed engineering, construction and project management activities for revamping projects for refinery which includes coordination with consultants, preparing contracts, evaluating contracts, conducting technical and financial negotiations with subcontractors and consultants, designing foundations and steel structures for mechanical equipments.

Kleinfelder Inc.

Apurva is key person for conducting risk assessments and preparing technical reports Tier 1, Tier 2 Evaluations, Subsurface investigation, corrective action plans including designing the remediation systems. She also reviews and guides the team for conducting risk assessments, subsurface investigations, soil vapor sampling, feasibility testing and designing remediation systems. She communicates with the clients and regulators regularly to discuss the technical reports. She is involved in coordinating underground storage tank removal and completing the remedial excavation based on the risk assessments. She is involved in installing monitoring wells, collecting soil samples by geoprobing, conducting slug test and analyzing the data by Aqtesolve, installing soil vapor monitoring points and collecting soil vapor samples using Summa canisters. She has successfully closed the sites in DC and DE by completing remediation if needed and RBCA program.

Brian P. Shedd
Hydrogeologist

Education

BS in Water Resources; State University of New York, College at Oneonta, Oneonta, NY, 2005

Professional Affiliations

National Ground Water Association

Association of Environmental and Engineering Geologists

Certifications

OSHA 40-Hour HAZWOPER
Loss Prevention System Training
First Aid and CPR
MDE Potable Water Sampling
NY DNR Soil Vapor Intrusion Training
US DOT HAZMat Training

Publications & Presentations

Co-Author, "SWISS – Innovative Discrete Interval Sampling Technology for Detection and Assessment of Pathogens and Contaminants in Soils and Ground Water," 2008 Joint Annual Meeting – GSA|SSSA|ASA|CSSA|GCAGS|GCSSEPM|NGWA, Paper #296-10, 2008.

Author, "SWISS – New Methodology for Cost Effective Discrete Interval Sampling," NGWA Conference on Eastern Regional Ground Water Issues, Paper #5267, 2008.

Co-Author, "An Exploration of Dual Phase Extraction Pilot testing Methodologies, Data Analysis, and Interpretation, including Implications for Radius of Influence Calculations," NGWA Ground Water Summit, Paper #5052, 2008.

Co-Author, "Conducting a Preliminary Water Supply Feasibility Assessment with Limited Data in Southern California," NGWA Ground Water Summit, Paper #5027, 2008; Pennsylvania Council of Professional Geologists Water and the Environment Symposium, 2008.

Co-Author, "Exploring Errant Slug Test Displacement Data", NGWA Ground Water Summit Paper #4047, 2007.

Author, "The Hydrologic Approximation of Paleo-discharge during Glacial Outbursts; An Empirical Approach," Thesis, SUNY College at Oneonta, 2005

Summary of Experience

Mr. Shedd has over three years of experience in the environmental industry associated with geology and hydrogeology. His experience includes risk assessment; ground water resources and subsurface characterization; well design, installation, construction, and testing; geophysical assessment and analysis; and ground water, surface water, and watershed modeling.

He is experienced with multiple techniques and technologies for rapid and efficient site assessment and remediation including the collection, interpretation, and reporting of data. He has used novel technologies such as continuous multi-channel tubing wells, geophysics, Membrane Interface Probe System (MIPS), and post run tubing (PRT) sampling, in order to assess and analyze site data more accurately and cost effectively. He has performed surficial and borehole geophysical surveys to assess geologic conditions and infer the hydrologic implications. He is experienced in hydrogeologic modeling, risk assessment, soil vapor intrusion, contaminant fate transport, and aquifer testing strategies and has applied these skills to a number of sites ranging in size and scope. He has overseen and analyzed data from numerous pumping and packer tests performed on bedrock potable supply wells and deep bedrock borings.

Mr. Shedd is experienced with the creation of site conceptual models to efficiently assess and make risk based decisions regarding potential future action ranging from additional site investigation, to remedial activities and design, to site closure; often using risk based and conceptual modeling approaches to complement his knowledge and experience in site investigation to seek the best possible solutions. He has an active relationship with local and state regulators and is familiar with local, state, and federal regulations and guidances.

His project experience includes drilling, hydrogeologic assessment and analysis, in-situ remediation, ground water/surface water interaction modeling, well site assessment, well design and construction oversight, aquifer testing and analysis, and reporting. Mr. Shedd has experience with more than 100 projects in Maryland, Delaware, Virginia, and the District of Columbia having overseen the installation of more than 200 wells and drilling of more than 6,000 linear feet using air rotary, hollow stem auger, and direct push techniques.

Mr. Shedd is currently providing technical support on sites in Maryland, Delaware, Washington D.C., and Virginia. He is responsible for drafting and implementation of work plans and subsequent reporting, analysis, and interpretation of field collected data. He interfaces directly with the client, regulators, and internal staff to ensure smooth project completion. Mr. Shedd also provides technical support in the preparation of proposals and has been actively involved in the regions developing water resources practice, including attending and presenting at key local conferences from agencies such as the Maryland Rural Water Association and National Ground Water Association.

Vapor Intrusion Investigation Estimate
Ron's Discount Energy Mart
2509 Philadelphia Pike
Claymont, DE
January 23, 2009

TASK 1.0: Project & Regulatory Coordination

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Project Manager	10	hrs.	$115.00	$1150.00
Staff Professional	10	hrs.	$90.00	$900.00
		Subtotal:		**$2,050.00**

Total Fee for Task 1.0 **$2,050.00**

TASK 2.0: Quarterly Groundwater Sampling and Reporting (1 Year)

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Gauge and Sample 9 Wells	4	event	$850.00	$3400.00
Quarterly Report	4	ea.	$650.00	$2,600.00
		Subtotal:		**$6,000.00**

2) Laboratory

Type	# Samples	$ per Sample	Mark-up	Cost
Laboratory (DNREC) - VOCs includes Trip Blanks	40	$100.00	15%	$4600.00
		Subtotal:		**$4,600.00**

Total Fee for Task 2.0 **$10,600.00**

TASK 3.0: Public Information Meeting

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Principal	2	hrs.	$180.00	$360.00
Senior Professional	12	hrs.	$140.00	$1680.00
Project Manager	12	hrs.	$115.00	$1380.00
Graphics Professional	4	hrs.	$70.00	$280.00
Administrator	4	hrs.	$45.00	$180.00
		Subtotal:		**$3880.00**

2) Equipment

Type	Quantity	Units	Rate/Unit	Cost
Vehicle	2	day	$100.00	$200.00
		Subtotal:		**$200.00**

Total Fee for Task 3.0 **$4,080.00**

TASK 4.0: Off-Site Access (11 Properties)

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Project Manager	6	hrs.	$115.00	$690.00
Staff Professional	22	hrs.	$90.00	$1980.00
Administrator	6	hrs.	$45.00	$270.00
		Subtotal:		**$2,940.00**

Total Fee for Task 4.0 **$2,940.00**

TASK 5.0: Zone 1 (Facility) Field Vapor Intrusion Investigation

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Project Manager	2	hrs.	$115.00	$230.00
Professional (PRT Installation)	8	hrs.	$70.00	$560.00
Professional (Soil Gas Sampling)	6	hrs.	$70.00	$420.00
		Subtotal:		**$1,210.00**

2) Equipment

Type	Quantity	Units	Rate/Unit	Cost
Vehicle	1	day	$100.00	$100.00
Mulit-Gas Meter	1	day	$100.00	$100.00
		Subtotal:		**$200.00**

3) Subcontractor

Type	Quantity	Rate	Mark-up	Cost
Geoprobe Contractor (Day)	1	$1,675.00	15%	$1926.25
PRT Materials w/ Manhole (Per Point)	4	$200.00	15%	$920.00
Permits	1	$75.00	15%	$86.25
		Subtotal:		**$2,846.25**

4) Laboratory

Type	# Samples	$ per Sample	Mark-up	Cost
Laboratory (Lancaster) - TO15	5	$210.00	15%	$1207.50
Laboratory (Lancaster) - Method 18	5	$40.00	15%	$230.00
		Subtotal:		**$1,437.50**

Total Fee for Task 5.0 **$5,693.75**

Vapor Intrusion Investigation Estimate
Ron's Discount Energy Mart
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TASK 6.0: Zone 2 (Residential) Field Vapor Intrusion Investigation

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Project Manager	6	hrs.	$115.00	$690.00
Staff Professional (Permits/Agent Forms)	6	hrs.	$90.00	$540.00
Professional (PRT Installation)	24	hrs.	$70.00	$1680.00
Professional (Soil Gas Sampling)	24	hrs.	$70.00	$1680.00
Administrator (Utility Markouts)	4	hrs.	$45.00	$180.00
		Subtotal:		**$4,770.00**

2) Equipment

Type	Quantity	Units	Rate/Unit	Cost
Vehicle	4	day	$100.00	$400.00
Mulit-Gas Meter	2	day	$100.00	$200.00
		Subtotal:		**$600.00**

3) Subcontractor

Type	Quantity	Rate	Mark-up	Cost
Geoprobe Contractor (Day)	2	$1,675.00	15%	$3852.50
PRT Materials w/ Manhole (Per Point)	14	$200.00	15%	$3220.00
Permits	7	$75.00	15%	$603.75
Tracer Gas	1	$125.00	15%	$143.75
		Subtotal:		**$7,820.00**

4) Laboratory

Type	# Samples	$ per Sample	Mark-up	Cost
Laboratory (Lancaster) - TO15	16	$210.00	15%	$3864.00
Laboratory (Lancaster) - Method 18	16	$40.00	15%	$736.00
		Subtotal:		**$4,600.00**

Total Fee for Task 6.0 **$17,790.00**

TASK 7.0: Zone 3 (Residential) Indoor Air Sampling

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Project Manager	5	hrs.	$115.00	$575.00
Staff Professional	32	hrs.	$90.00	$2880.00
		Subtotal:		**$3,455.00**

2) Equipment

Type	Quantity	Units	Rate/Unit	Cost
Vehicle	3	day	$100.00	$300.00
		Subtotal:		**$300.00**

3) Laboratory

Type	# Samples	$ per Sample	Mark-up	Cost
Laboratory (Lancaster) - TO15	12	$210.00	15%	$2898.00
Laboratory (Lancaster) - Method 18	12	$40.00	15%	$552.00
		Subtotal:		**$3,450.00**

Total Fee for Task 7.0 **$7,205.00**

TASK 8.0: Data Analysis and Reporting

1) Professional Services

Title/Name	Quantity	Units	Rate/Unit	Cost
Principal	6	hrs.	$180.00	$1080.00
Senior Professional	12	hrs.	$140.00	$1680.00
Project Manager	40	hrs.	$115.00	$4600.00
Professional	8	hrs.	$70.00	$560.00
Graphics Professional	8	hrs.	$70.00	$560.00
Administrator	10	hrs.	$45.00	$450.00
		Subtotal:		**$8930.00**

2) Equipment

Type	Quantity	Units	Rate/Unit	Cost
Vehicle	1	day	$100.00	$100.00
		Subtotal:		**$100.00**

Total Fee for Task 8.0 **$9,030.00**

TOTAL ESTIMATED FEE **59,388.75**