

**APPENDIX S – SUPPLEMENTAL SITE INVESTIGATION REPORT SAMPLE**

**Supplemental Site Investigation  
Report**

**[Site Designation]**  
**[Site Address or Major Cross Streets]**  
**[City], California [Zip Code]**  
**[Site Code]**

Prepared for:  
**[School District]**  
**[District Office Address]**  
**[City], California [Zip Code]**

Prepared by:  
**[Consultant Company]**  
**[Office Address]**  
**[City], California [Zip Code]**

**[Date of Report]**

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## EXECUTIVE SUMMARY

The executive summary should summarize the main information presented in the Supplemental Site Investigation Workplan. It should include, but not be limited to, the following information:

- Purpose of the Supplemental Site Investigation Report
  - Identification of areas of concern being addressed and description of additional investigation based on the findings of the Supplemental Site Investigation.
  - Identification of the technical memorandum or workplan used to guide the assessment.
- School district
- Site designation consistent with information submitted to the California Department of Education
- Site location
  - Street address or nearest cross streets
  - City and county
- Site description
  - Size of the site (preferably in acres)
  - Current and historical business activity conducted on site
- Type of school site – proposed, expansion, or existing
- Type of school proposed – grade levels of students
- Number of classrooms and students
- Intended use of the site – whether all or a portion of the site will be used
- Brief summary of findings of assessment
- Conclusions
- Recommendations

# TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	ii
TABLE OF CONTENTS .....	iii
ABBREVIATIONS AND ACRONYMS .....	vi
1.0 INTRODUCTION.....	1
1.1 Purpose .....	1
1.2 Scope of Work .....	2
2.0 SITE DESCRIPTION .....	3
3.0 AREAS OF CONCERN .....	4
4.0 ENVIRONMENTAL SETTING .....	5
5.0 CONCEPTUAL SITE MODEL .....	6
6.0 DATA GAPS.....	7
7.0 SUMMARY OF SAMPLING ACTIVITIES .....	8
7.1 Sampling Objectives .....	8
7.2 Sampling Approach.....	8
7.3 Sampling Locations and Rationale .....	8
7.4 Sample Collection .....	8
7.4.1 Sampling Equipment and Procedures.....	8
7.4.1.1 Decontamination.....	8
7.4.1.2 Preparation .....	8
7.4.2 Containers and Preservation.....	8
7.4.3 Packaging and Shipment .....	9
7.4.4 Documentation .....	9
7.5 Sample Analyses .....	9
7.5.1 Field .....	9
7.5.2 Laboratory .....	9
7.6 Analytical Results .....	9
7.7 Investigation Derived Waste .....	9
7.8 Field Conditions .....	10
7.9 Field Variances.....	10

8.0	QUALITY ASSURANCE .....	11
8.1	Review of Project QC Program.....	11
8.1.1	QC Procedures .....	12
8.1.2	QC Samples.....	13
8.1.2.1	Field QC Samples.....	13
8.1.2.2	Background Samples.....	14
8.1.2.3	Split Samples.....	14
8.1.2.4	Field Test Confirmatory Samples.....	14
8.1.2.5	Laboratory QC Samples .....	14
8.2	Review of Sampling Procedures.....	16
8.3	Review of Analytical Procedures .....	16
8.4	Review of Data Reports.....	17
8.5	Review of Data Quality Objectives (DQOs) .....	18
8.6	Data Validation Memorandum .....	20
9.0	HEALTH AND SAFETY .....	21
10.0	ENVIRONMENTAL MIGRATION SCREENING EVALUATION.....	22
11.0	HUMAN HEALTH SCREENING EVALUATION .....	23
11.1	Identification of Chemicals of Potential Concern.....	23
11.1.1	Comparison of Site Data with Background.....	23
11.2	Screening Evaluation Assumptions and Exposure Factors.....	23
11.2.1	Land Use Scenarios.....	23
11.2.2	Exposure Pathways and Media of Exposure.....	23
11.2.3	Chemical Groups .....	23
11.2.4	Exposure Point Concentrations.....	23
11.2.5	Indoor Air Evaluation.....	23
11.2.6	Toxicity Values and Summary Tables.....	23
11.3	Risk and Hazard Characterization .....	23
11.3.1	Selection of Pathways.....	23
11.3.2	Water Pathway.....	24
11.3.3	Soil Pathway .....	24
11.3.4	Air Pathway .....	24
11.3.4.1	Particulates (Outdoor).....	24
11.3.4.2	Vapor (Outdoor).....	24
11.3.4.3	Vapor (Indoor).....	24
11.3.5	Summary of Risk and Hazard for All Media .....	24
11.3.6	Uncertainty Analysis.....	24
11.4	Special Hazardous Material Considerations .....	24
11.4.1	Anthropogenic.....	24
11.4.2	Arsenic.....	24
11.4.3	Lead.....	24
11.4.4	Methane and Hydrogen Sulfide.....	24
11.4.5	Naturally Occurring Asbestos.....	24
11.4.6	Petroleum Hydrocarbons .....	25

11.4.7 Radon .....	25
12.0 PUBLIC PARTICIPATION .....	26
13.0 COMPLIANCE WITH ADDITIONAL REGULATORY REQUIREMENTS .....	27
14.0 FINDINGS .....	28
15.0 CONCLUSIONS AND RECOMMENDATIONS.....	29
16.0 REFERENCES.....	30
17.0 SIGNATURE AND QUALIFICATIONS OF RESPONSIBLE PROFESSIONALS	31

**FIGURES**

Figure 1	Site Location Map
Figure 2	Site Vicinity Map
Figure 3	Site Plan
Figure 4	Areas of Concern
Figure 5	Conceptual Site Model
Figure 6	Site Plan with Sampling Locations and Results
Figure 7	Project Schedule

**TABLES**

Table 1	Summary of Sampling Locations and Rationale
Table 2	Summary of Analytical Results
Table 3	Summary of Risk
Table 4	Summary of Hazard

**APPENDICES**

Appendix A	Site Photographs
Appendix B	Field Logs
Appendix C	Boring Logs
Appendix D	X-Ray Fluorescence Data Reports
Appendix E	Laboratory Reports and Chain-Of-Custody Documentation
Appendix F	Data Validation Memorandum
Appendix G	Waste Management Documentation
Appendix H	Copies of Public Notices

## ABBREVIATIONS AND ACRONYMS

Abbreviation Description  
or acronym

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## 1.0 INTRODUCTION

The introduction should introduce the site, present the organization of the report, and include the following information:

- School district
- Site designation consistent with information submitted to the California Department of Education
- Site location
  - Street address or nearest cross streets
  - City and county
- Type of school site – proposed, expansion, or existing
- Type of school proposed – grade levels of students
- Number of classrooms and students
- Intended use of the site – whether all or a portion of the site will be used
- Proposed disposition of existing structures
- Proposed source of potable and non-potable water supply

The introduction should also identify the areas of concern that lead to the recommendation for further action and the reason for preparing a Supplemental Site Investigation (SSI) Report which may include:

- A PEA Report was submitted for DTSC review and approval and DTSC provided a determination that a further action is required to address a release or threatened release of hazardous material or the presence of a naturally occurring hazardous material, which would pose a threat to public health or the environment under unrestricted land use. Provide the date of the determination letter and include a copy of the letter in Appendix A.

This section should reference the SSI Technical Memorandum or Workplan approved by DTSC, including the document title, author, date of preparation, and date of the approval letter forwarded by DTSC.

### 1.1 PURPOSE

This section should state the purpose of the SSI, part of the third step of the environmental review process for school sites, with respect to areas of concern identified for the site. These objectives should include, at a minimum:

- Determine the horizontal and vertical extent of contamination encountered during the PEA.

- Evaluate potential threat(s) to public health and the environment posed by chemicals of concern.
- Evaluate whether remedial action is required.

This section may also include other objectives or reasons as requested by the school district.

## **1.2 SCOPE OF WORK**

The scope of work should provide a detailed scope of services conducted for the PEA, including assumptions, limitations and exceptions, special terms and conditions, and user reliance. This section should list the DTSC requirements or guidance complied with to meet the objectives of the SSI Report.

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## 2.0 SITE DESCRIPTION

This section should include the following school site designation and location information:

- School site designation consistent with information submitted to CDE.
- Other site designations used historically.
- United States Environmental Protection Agency (U.S. EPA) identification number, if assigned.
- DTSC EnviroStor database number, if assigned.
- Street address or nearest cross streets, city or nearest community, county, state, zip code
- School district
- Size of the site (preferably in acres)
- Assessor's parcel number
- Township, range, section, and principal meridian
- Geographic coordinates (longitude and latitude)
- State Senate and Assembly districts

This section should also a summary of current and historical activities, and a brief summary of the environmental assessments or investigations leading up to the SSI. This section can reference the PEA Report for more details, but enough information should be provided to ascertain the areas of concern and associated chemicals of concern, update the conceptual site model, identify data gaps, and justify the sampling proposed.

### 3.0 AREAS OF CONCERN

This section should summarize the following findings of the PEA conducted to address RECs identified in the Phase I (or after review of information consistent with a Phase I):

- Nature and extent of contamination, determined thus far, based on sampling.
- Fate and transport based on the environmental migration screening evaluation.
- Human health risk based on the human health screening evaluation.

Based on these findings, the areas of concern (AOCs) and associated chemicals of concern should be identified. For each AOC, following information should be presented:

- Chemicals of concern
- Extent to which the AOC has been characterized horizontally and vertically
- Media impacted

## 4.0 ENVIRONMENTAL SETTING

As part of the Phase I (or review of information consistent with a Phase I), information should have been collected regarding the site's environmental characteristics. This section should include a summary of the following information:

- Topographic, geologic, and hydrogeologic features associated with the site and surrounding areas.
- Potential pathways (soil, groundwater, surface water, and air) of contaminant migration and environmental conditions which would influence the fate and transport of contaminants from the source of contamination through identified potential exposure pathways to the exposed individual or environmental receptor.

This section can reference the PEA Report for more details, but enough information should be provided to update the conceptual site model, identify data gaps, and justify the sampling proposed.

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## 5.0 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) from the PEA Report should be updated to include the results of the PEA investigation. The CSM should include a narrative and graphical description of site characteristics, and should provide a foundation for understanding a site. The CSM integrates the areas of concern and chemicals of potential concern with the environmental setting at the site. The CSM should identify potential contamination sources and link them to potential receptors through release mechanisms, potential pathways, and exposure routes. The CSM should incorporate all essential features of the topographic, geologic, and hydrogeologic systems at the site. The degree of detail and accuracy of the CSM will vary according to the site setting and contaminant type(s). For simpler sites, the CSM may only include a discussion of areas of concern, a figure showing potential exposure scenarios (Figure 5A) and a site plan. For more advanced sites (e.g., sites with NOA or impacts to groundwater), a more detailed CSM will be necessary and may also include figures such as groundwater flow maps, iso-concentration drawings, geologic cross-sections, and detailed geologic maps of the surface and subsurface. Examples of such figures are included in Figures 5B through 5D.

The CSM is an iterative process. The initial CSM is used to develop the Field Sampling Plan (FSP) which is designed to determine the source of contamination, evaluate the migration potential and assess the exposure potential. As data gaps are identified and additional data is collected, the CSM should be revised. The resulting final CSM should be detailed enough to meet the characterization objectives, and provide enough information to make appropriate regulatory decisions.

## **6.0 DATA GAPS**

Data gaps identified in the SSI Technical Memorandum or Workplan, based on the conceptual site model, should be presented in this section. Data gaps are missing information necessary to form conclusions and recommendations for the site that will ultimately lead to a regulatory decision. These data gaps should be used to form the objectives for and direct sampling activities.

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## **7.0 SUMMARY OF SAMPLING ACTIVITIES**

This section should describe how sampling activities were actually conducted in the field, present the analytical data, and provide discussion of the results. Explanations of variations from the PEA Technical Memorandum or Workplan should be integrated throughout this section and subheadings.

### **7.1 SAMPLING OBJECTIVES**

The sampling objectives from the PEA Technical Memorandum or Workplan should be restated.

### **7.2 SAMPLING APPROACH**

This section should describe the sampling approach utilized.

### **7.3 SAMPLING LOCATIONS AND RATIONALE**

This section should repeat the sampling locations and rationale presented in the DTSC-approved PEA Technical Memorandum or Workplan.

### **7.4 SAMPLE COLLECTION**

This section should describe all equipment used to obtain samples.

#### **7.4.1 Sampling Equipment and Procedures**

This section should describe all equipment used to obtain samples.

##### **7.4.1.1 DECONTAMINATION**

A description of equipment and personnel decontamination and disposal of materials should be provided. Anything affecting the possibility of cross-contamination should be included.

##### **7.4.1.2 PREPARATION**

A description of the methods used to homogenize, split, and composite samples should be provided.

#### **7.4.2 Containers and Preservation**

This section should describe the sample containers and type of pre-cleaning method used. Documentation that containers were certified clean by the suppliers should be included in an Appendix C. This section should also identify the preservatives used for the different analyses.

### **7.4.3 Packaging and Shipment**

This section should describe the methods used for labeling, sealing, packaging, and shipping samples.

### **7.4.4 Documentation**

This section should present the following documentation described in the PEA Technical Memorandum or Workplan:

- Field logs
- Boring logs
- Chain-of-custody
- Photographs
- Field analysis documentation

Copies of this documentation should be provided in the appendices.

## **7.5 SAMPLE ANALYSES**

This section should identify the field and laboratory analyses performed on each sample or group of samples. Analyses for each sample should be added to Table 1. The description of analyses should include preparation and analytical methods, analytes, quantitation limits, holding times, and preservation. Quantitation limits should be less than the screening value used for comparison.

### **7.5.1 Field**

This section should discuss field analyses, such as x-ray fluorescence (XRF), including the preparation and analytical method, analytes, quantitation limits, holding times, and preservation.

### **7.5.2 Laboratory**

This section should discuss laboratory analyses, including the preparation and analytical method, analytes, quantitation limits, holding times, and preservation.

## **7.6 ANALYTICAL RESULTS**

The following subsections should summarize the analytical results from both field and laboratory analysis. Data reports for field analysis should be included in Appendix D and those for laboratory analysis should be included in Appendix E.

## **7.7 INVESTIGATION DERIVED WASTE**

This section of the report should describe the management and disposition of wastes generated during the investigation, including soil cuttings, personal protective equipment, decontamination water, etc. Justification for the management and disposition of wastes should also be provided and should be consistent with the U.S. EPA Guide to Management of Investigation-Derived Wastes (U.S. EPA 1992).

Copies of any disposal documentation, such as hazardous waste manifests or bill of lading for non-hazardous waste, should be provided in Appendix G to the report.

## **7.8 FIELD CONDITIONS**

Include a summary of the prevalent field conditions during the sampling activities. Field conditions sometimes can potentially impact the sampling activities in a number of ways. For example, in case of a rain event, soil gas sampling may be postponed until the field conditions are adequate for the sampling. Additionally, if the soil gas probes are flooded as a result of a recent rain event, it may not be possible to collect a sample.

## **7.9 FIELD VARIANCES**

In most cases, DTSC-approved work plan will be followed to conduct field activities and field variation may not be needed. However, it is recognized that in some cases variance from the approved work plan may be necessary because of miscellaneous factors. The typical examples of variance may include:

- Any addition/deletion of the sampling location for soil, soil gas, groundwater, surface water, sediments, in case of access limitation and/or other physical constraints
- Modifications to the screen interval based on the review of geologic data in the field and/or final depth of the sample
- Addition and/or substitution of any analytical methods for based on the field observation
- Changes in depth of the sample based on the field observation and/or readings from the field instrument

In case a soil gas sampling probe is flooded because of a rain event, grab groundwater sampling may be appropriate in accordance with the PEA workplan.

## **8.0 QUALITY ASSURANCE**

A quality assurance and quality control (QA/QC) program should be specified in Quality Assurance Project Plan (QAPP) to provide an appropriate level of assurance regarding the reliability and usability of the data generated during the proposed environmental sampling investigation. The QAPP should have been submitted with the PEA Workplan.

The overall QA/QC should ensure that sampling, analysis and reporting activities provide data quality consistent with the intended use. The QA objectives are to assure that the collected data will be accurate, precise, representative, and legally defensive. QC represents the specific steps and procedures to be followed during the course of the project to achieve QA. The primary QC features include collection and analysis of QC samples, field audit, and data validation.

As part of the QA/QC program, data validation should be conducted to evaluate performance of data collection against pre-determined methods, procedural, or contractual requirements specified in the FSP. It routinely assesses how closely the FSP has been followed during data generation in the field and laboratory. It checks for improper practices, abuse and warning signs shown during the sampling investigation.

The purpose of the data validation is to determine both the quality of the data based on compliance with all QA measures and the achievement of a project's data quality objectives (DQOs). It determines if the available data satisfies the project's DQOs and data use requirements by evaluating the data reports for field sampling procedures, laboratory performance and error checks. Data validation generally includes reviews of the following items:

- project QC program,
- sampling procedures,
- analytical procedures,
- data reports, and
- DQOs.

### **8.1 REVIEW OF PROJECT QC PROGRAM**

The FSP should include a QC program for the proposed sampling and analysis. To ensure that data is of the highest confidence and known quality to satisfy the project objectives and to meet or exceed the requirements of the standard methods of analysis, review of the project QC program should include evaluation of the project's QC procedures and QC samples. Any deficiencies and impacts (e.g., deviations caused by

newly discovered site conditions) should be identified and discussed, and appropriate corrective actions recommended and taken.

### 8.1.1 QC Procedures

QC procedures, required to ensure that the site conditions and nature and extent of contamination are properly evaluated, include:

- adherence to strict protocols for field sampling and decontamination procedures;
- collection and laboratory analysis of appropriate field equipment and trip blanks to monitor for contamination of samples in the field or the laboratory;
- collection and laboratory analysis of matrix spike (MS), MS duplicate (MSD), and field duplicate samples to evaluate precision and accuracy; and
- attainment of completeness goals.

Evaluation criteria for basic QC procedures should include, but are not limited to, field decontamination, supplies, holding times, equipment calibration and maintenance, and standards, as described below:

- **Field Decontamination:** Non-dedicated equipment should be decontaminated before and/or after each sample collection. The equipment should be washed with a non-phosphate detergent, rinsed in potable water, and double rinsed with distilled water. A description of the specific methodologies followed to maximize proper equipment decontamination and with consideration for collection of equipment rinsate samples should be provided.
- **Supplies:** All supplies should be certified clean or new by the suppliers, inspected by the project team prior to their use, and monitored by the employed laboratory through the use of standards and blank samples as appropriate. Appropriate supplies, e.g., special water sample bottle for paraquat analysis, should be clearly specified. The description for sample collection and analysis contained in the methods should be used as a guideline for establishing the acceptance criteria for supplies.
- **Holding Times:** Holding time is the maximum time samples may be held prior to analysis and still be considered valid. It starts at the time of sample collection. Holding time for each analytical method and analyte should be provided and any holding time shorter than 30 days be clearly specified. If holding times are exceeded, and the analyses are performed, the associated results should be qualified.
- **Preventative Maintenance and Standards:** Analytical equipment should be properly calibrated and maintained as recommended by manufacturers and/or described in the employed laboratory's QA plan and Standard Operating Procedures (SOPs). Procedures specific to the calibration, use and maintenance of field equipment should be presented in the FSP. Standards used for laboratory equipment calibration or to prepare samples should be current, labeled with valid expiration

dates and certified by or traceable to National Institute of Standards and Technology (NIST) or other equivalent source. The laboratory's documentation of compliance and raw data should be made available to DTSC upon request and may be subject to audit by inspectors of the oversight agency and/or ELAP. The laboratory QA plan and SOPs should be included in the FSP or maintained in the project file.

## 8.1.2 QC Samples

To check for precision and accuracy of project data, appropriate QC samples should be collected for analysis at the specified frequency. These include field QC samples, background samples, split samples, field measurement confirmation samples, laboratory QC samples and/or positive confirmation samples. QC samples for soil gas investigations are specifically specified in DTSC's "Advisory – Active Soil Gas Investigations, dated January 28, 2003" (or its current version). QC samples for other investigations are discussed below. All proposed sample locations (including QC samples) should be identified and a rationale provided for the choice of location in the FSP.

### 8.1.2.1 FIELD QC SAMPLES

Field QC samples, used to evaluate conditions resulting from field activities, include blanks (for assessment of field contamination) and duplicates (for assessment of sampling variability). They should be samples expected to contain moderate levels of contamination and should be collected, preserved, packaged, stored, transported, and analyzed in a manner consistent with site samples. Field QC samples should be sent to the laboratory blind.

Field duplicates should be collected from areas of known or suspected contamination at a rate of at least 10 percent (%) of primary samples collected per analyte per sample matrix per event.

Common blanks are equipment rinsate blanks, field blanks, trip blanks and temperature blanks as described below:

- **Equipment Rinsate Blanks:** When decontamination of re-useable, non-disposable sampling equipment (e.g., hand augers, direct push rods, groundwater sampling pumps) is necessary, at least one (1) equipment rinsate blank per analyte per day (per 10 samples?) should be collected by pouring de-ionized or distilled water through the decontaminated or cleaned sampling equipment used for sampling.
- **Field Blanks:** When no equipment decontamination is required at all (e.g., utilization of one-time-use spoons for surface sampling or direct collection of groundwater samples from existing well valves), at least one (1) field blank per sample matrix per analyte per day should be collected by pouring de-ionized distilled water (or proper sampling medium standards as necessary) into a sample container at a specific sampling point.

- Trip Blanks: When transportation and offsite analysis of volatile organic compound (VOC) samples are needed, at least one (1) trip blank per sample matrix should accompany every shipment of blank containers shipped to the field and VOC samples shipped from the field (except for canister samples of VOCs or otherwise specifically exempted by the oversight agency). Trip blanks should be obtained by filling appropriate sample containers with clean medium which are free of VOCs and in the same matrix of site VOC samples.
- When temperature variation is critical to sample integrity (e.g., when low temperature sample preservation is required), one (1) temperature blank, consisting of a 40 milliliter (mL) VOA vial of clean water labeled “temperature blank,” should be included in each shipment cooler.

#### **8.1.2.2 BACKGROUND SAMPLES**

A minimum of four (4) background sample locations per medium should be chosen from non-impacted, upgradient, upwind and upstream areas (with similar strata to proposed sampling locations) onsite or near the site. Background metal data from a nearby site with similar strata conditions may be utilized instead. However, collection of background lead and arsenic samples may not be required because DTSC’s initial screening values for lead and arsenic in soil at school sites can be utilized for data interpretation and screening risk evaluation, unless it is wanted to differentiate between onsite and offsite contributions to contamination. In addition, risk assessment calculations should be made with all detected naturally occurring compounds, with the exception of lead and arsenic, assumed to be chemicals of potential concern (COPCs).

#### **8.1.2.3 SPLIT SAMPLES**

Split samples are samples that physically divided (or co-located when volatilization is not a problem) and analyzed by different laboratories for the purpose of providing an inter-laboratory or inter-organization comparison. For example, metal samples may be divided in half after being homogenized thoroughly in a pail. DTSC or interested parties (e.g., potential responsible parties, property owners, or community members) may request split samples for performing independent analyses.

#### **8.1.2.4 FIELD TEST CONFIRMATORY SAMPLES**

When field instrument is used for measurements, e.g., x-ray fluorescence (XRF) is used for lead analysis or handheld instrument is used for methane measurement, field test confirmatory samples should be collected in addition to routine QC samples (e.g., duplicates and standard samples). Follow the appropriate DTSC guidance documents for number and frequency of field test confirmatory samples.

#### **8.1.2.5 LABORATORY QC SAMPLES**

As part of standard laboratory QC protocols, each laboratory monitors the performance (precision and accuracy) of the results of its analytical procedures through analyses of laboratory QC samples as specified in the laboratory QA plan/SOPs and the analytical method requirements. Laboratory QC samples include method blanks, reagent spikes,

laboratory duplicates, laboratory control spike (LCS) samples, matrix spikes (MS) and matrix spike duplicates (MSD), surrogate compounds, positive confirmation samples, initial and continuing calibration checks, tuning checks, and/or performance evaluation (PE) samples. Required laboratory QC samples for each project should be identified and additional sample amount (e.g., a double or triple volume) collected for that purpose to avoid collection of a separate sample for laboratory QC purposes. Any samples with visual sign of contamination should be noted to the employed laboratory for possible preparation of laboratory QC samples.

The requirements for laboratory QC samples vary. However, the frequency for laboratory QC samples should be at least one (1) per batch of up to 20 total samples (including blanks and duplicates), five percent (5 %) of the primary field samples or 14 days, whichever requires greater number of laboratory QC samples. Common laboratory QC samples are described below.

- Method Blanks: Method blank at the specified frequency should be analyzed to assess the level of background interference or contamination in the analytical system (during sample preparation and analysis). When compounds are found in the blank, their values are evaluated to determine their effect on the analysis of environmental samples.
- MS and MSD Samples: MS and MSD pair at the specified frequency should be analyzed to evaluate the precision and accuracy of the procedures and to check sample matrix interferences.
- LCS Samples: LCS samples are clean matrices (e.g., reagent water or a clean solid such as sand, glass beads, or sodium sulfate) that have been spiked with a known quantity of a compound or group of compounds and are processed with every analytical batch of environmental samples. The percentage of the compound that is recovered in the analysis provides a measure of method accuracy. When analysis of the LCS is repeated, the standard deviation provides a measure of analytical precision. LCS sample at the specified frequency should be analyzed.
- Laboratory Duplicates: When the MS/MSD pair does not meet the precision or accuracy requirements or otherwise as appropriate, laboratory duplicate at the specified frequency should be prepared and analyzed in the laboratory.
- Positive Confirmation Samples: For samples detected positive with certain analyte (e.g., perchlorate), the presence of the analyte in the positive samples may need to be analyzed and confirmed by a more sensitive method. See appropriate methods or regulatory guidance for appropriate requirements.
- Performance Evaluation (PE) Samples: Standard or project-specific PE samples may be submitted to the analytical laboratory during any site investigation to assess the precision and accuracy of analytical procedures employed for a given sample set. PE samples may be submitted for analysis as part of the laboratory pre-

qualification process for a given sampling event. If questionable data quality is suspected as determined during laboratory audits or data validation, PE samples should be used. Results will be reported to the laboratory and presented with associated field sample results.

## **8.2 REVIEW OF SAMPLING PROCEDURES**

Field activities should be planned, conducted and completed in a manner consistent with the FSP and be monitored through a field audit and photo documentation. Review of sampling and handling procedures should involve evaluation of utility clearance, field tests, field documentation, boring logs, sample conditions, investigation derived waste (IDW) management, and field audits.

Proper utility clearance should be completed prior to initiating any soil intrusion work. Field tests may be used in conjunction with confirmation samples analyzed in a fixed laboratory. Specific field analyses for pH, conductivity, turbidity, or others (e.g., immunoassay tests, XRF tests, soil gas investigations) should be discussed in the FSP.

Field logs and other documentations should be reviewed regarding sampling procedures, e.g., sample containers, collection, preservation, packaging, transportation, receipt, handling and storage, sample identification, chain of custody, holding time, and decontamination procedures. Upon receipt, the employed laboratory should inspect sample conditions and report the information accordingly on the chain of custody forms. Boring logs for any boring depth of 5 feet or deeper should be prepared under supervision of a California registered professional (e.g., professional civil engineer or geologist) in accordance with the California Business and Professions Code.

IDW should be managed as hazardous waste until proven otherwise or until specifically approved by DTSC as being non-hazardous waste. IDW should be properly drummed, labeled and securely onsite until an appropriate means of disposal can be determined. To ensure appropriate disposal of IDW, the average levels of all analytical results may be used to determine whether the IDWs are hazardous waste.

During the course of field work, routine field audits should be conducted. DTSC will also provide field oversight to spot check field work.

## **8.3 REVIEW OF ANALYTICAL PROCEDURES**

The FSP should discuss the analyses requested, analytes of concern, turnaround times, and available laboratories. Review of analytical procedures includes laboratory accreditation, analytical methods, laboratory QC samples, internal standards, retention time windows, reporting limits, instrument calibration, tentatively identified compounds (TICs), and laboratory audits.

- The employed laboratory shall be ELAP or NELAP certified for the analysis requested unless no such certification is available for the analysis.

- It is DTSC's policy to use only the test methods found in SW-846 and California Code of Regulation, Title 22, for analysis of hazardous constituents, unless otherwise specifically allowed by DTSC. All analyses should be performed as specified in the requirements of DTSC-approved analytical methods and the employed laboratory's standard operating procedures (SOPs) and QA plan.
- The common laboratory QA/QC procedures include method blanks, surrogates, matrix spike and matrix spike duplicates, laboratory duplicates and initial and continuing calibration checks.
- If the internal standard recovery falls outside of acceptable criteria, the instrument should be checked for malfunction and reanalysis of the sample should be performed after any problems are resolved.
- Retention times should be checked on a daily basis. If the retention time for an analyte falls outside its respective window, the instrument should be recalibrated and the affected samples be reanalyzed.
- Review of surrogates, retention time window and TICs is not necessary for inorganic analyses.
- All collected samples should be delivered to the employed laboratory for appropriate analyses immediately after their collection. Samples not analyzed immediately should be archived by the laboratory for possible later analysis.
- Laboratory audits include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, QA/QC protocols, and data reporting. If no previous audit has been conducted, a scheduled audit should be considered prior to selection of the laboratory or after discovery of significant laboratory discrepancies.

#### **8.4 REVIEW OF DATA REPORTS**

All laboratory reports should be comparable with previous USEPA Level II contract laboratory documentation. All data should be reviewed in accordance with the project sampling and analysis workplan, the employed laboratory's standard operating procedures (SOPs), the principles present in USEPA National Functional Guidelines for Laboratory Data Review – Organics (USEPA, 1999) and Inorganics (USEPA, 2002), and the professional judgment of the project validation team to ensure that the data produced are credible, cost-effective, and of known and defensive quality. The areas of data review should include:

- Completeness of the laboratory reports (e.g., laboratory/client/sample identifications, ELAP certification number, project name, sample matrix, analytes, analytical methods, sample collection/preservation/preparation/extraction/analysis dates, reporting units/limits, dilution factors, report page numbering system, designated title and signatures);

- Chain of custody;
- Analytical methods and reporting limits;
- Sample containers and conditions;
- Holding times;
- Sample preservation;
- Field QC samples (e.g., equipment blanks, field blanks, trip blanks, temperature blanks, duplicates, split samples, as applicable);
- Laboratory QC samples (e.g., method blanks, laboratory control samples, matrix spike and matrix spike duplicates, duplicates, as applicable);
- Surrogate recoveries (as applicable for organic analyses only);
- Compound identification and quantification;
- Dilution factors;
- Data qualifiers;
- Tentatively identified compounds (TICs);
- Confirmation of positive samples, as applicable
- Observations regarding any occurrences which may adversely affect sample integrity or data quality; and
- Case narrative describing all qualified data, TICs, variances, deviation or deficiencies encountered (during field sampling or laboratory analysis), possible reasons (with verifications), potential impacts, and corrective actions taken, if any.

If elevated levels of non-target compounds or TICs are detected, such as other heavy metals have been detected during the analysis of lead samples by Method 6010C, these non-target compound data should be discussed with DTSC before the data is included in the investigation report and submitted to DTSC for approval.

When significant discrepancies of analytical results are identified, a data audit should be performed to review the complete raw data files and supporting documentation, including verification of data calculations for calibration and QC samples. The data audit will determine if the deviations will result in any adverse effect on the project conclusions and if a corrective action is necessary.

## **8.5 REVIEW OF DATA QUALITY OBJECTIVES (DQOS)**

Data quality objectives (DQOs) are qualitative and quantitative statements for establishing the criteria for data quality and for developing data collection designs. DQOs also establish the acceptable or appropriate levels of uncertainty associated with a set of data. Data quality may need to be legally defensible or simply capable of determining only the “presence-absence” question.

USEPA’s systematic planning guidance, “Guidance for the Data Quality Objectives Process (EPA QA/G-1, August 2000) should be used to define how environmental data will be used for environmental decision making. The seven steps of the DQO process are:

- State the Problem;

- Identify the Decision;
- Identify Inputs to the Decision;
- Define the Study Boundaries;
- Develop a Decision Rule;
- Specify Limits on Decision Error; and.
- Optimize the Design.

The “Specify Limits on Decision Errors” portion should contain supporting rationale for why the number of proposed samples and the proposed quality of the data are deemed appropriate for the data quantity and data quality needs. A statistical support, e.g., Visual Sample Plan available at <http://dgo.pnl.gov/vsp>, should be used to define a clear and defensible scientific rationale for the proposed sampling frequency.

The project DQOs should be evaluated to determine whether the quantitative and qualitative needs of the sampling and analysis program have been met. The DQOs should be specified in terms of specific data quality indicators (DQIs), i.e., precision, accuracy, representativeness, completeness, comparability, and reporting limits (RLs).

Qualitative DQIs are comparability and representativeness.

- Comparability expresses the confidence with which one data set can be compared to another for trends or changes (in space or time) at the site.
- Representativeness is the degree to which data accurately and precisely represent the actual site conditions through sufficient number of samples, appropriate sampling methodologies, necessary decontamination and proper QA/QC procedures.

Quantitative DQIs are precision, accuracy, completeness and RLs.

- Precision measures the reproducibility of repetitive measurements by assessing the standard deviation or relative percent difference (RPD) between analyses of the sample and the duplicate. The RPD limit for laboratory QC samples and site data of appropriate media (soil, soil gas and groundwater) should be provided in the FSP. RPD is calculated:

$$\% \text{ RPD} = 200\% \frac{|X_r - X_d|}{(X_r + X_d)},$$

where  $X_r$  is the measurement of the sample, and  $X_d$  is the measurement of the duplicate or replicate sample.

- Accuracy is a measurement of correctness by comparing a sample measurement with a known value. Field accuracy is achieved if no contamination is detected in equipment rinsate and trip blanks. Laboratory accuracy is achieved if all recoveries (expressed as the % recovery) of laboratory QC samples and initial and continuing calibrations of instruments are reported within the corresponding control ranges.

- Completeness is the amount of valid usable data obtained compared to the amount expected under ideal conditions. Completeness may be affected by such factors as sample bottle breakage and acceptance/non-acceptance of analytical results. At least 90% of the planned data results should be obtained and valid. Completeness is calculated:

$$\% \text{ completeness} = 100\% \cdot (\text{number of valid results}) \div (\text{number of planned results})$$

- Reporting Limits (RLs) should be low enough to 1) evaluate detected compounds against the screening levels, and 2) eliminate undetected compounds for further consideration in a quantitative risk assessment. As appropriate, screening levels may be risk-based criteria calculated in accordance with DTSC's guidance documents or published values, such as the California Human Health Screening Levels (CHHSLs) established by the California Office of Environmental Health Hazard Assessment (OEHHA), the Preliminary Remediation Goals (PRGs) by USEPA Region IX (including the Cal/EPA-modified PRGs), the Environmental Screening Levels (ESLs) by the San Francisco Bay Regional Water Quality Control Board, or regulatory standards. The planned RLs for soil gas samples should comply with the DTSC's Advisory – Soil Gas Investigations.

If matrix bias is suspected, the associated data may be qualified (as estimates or appropriate) and the direction of the bias indicated in the data validation report. If the DQOs or criteria are not fully achieved, such variances will trigger appropriate QA/QC measures needed to evaluate and correct the activities, as necessary; however, the data may not be considered invalid.

## **8.6 DATA VALIDATION MEMORANDUM**

A data validation memorandum should be prepared by a qualified professional (e.g., laboratory director or chemist, project manager or QA/QC manager) to summarize the findings of a Level II data validation for all analytical results and included as Appendix F in the report. A sample Data Validation Memorandum is posted on DTSC webpage: [http://www.dtsc.ca.gov/Schools/upload/Data\\_Validation.pdf](http://www.dtsc.ca.gov/Schools/upload/Data_Validation.pdf). See the sample Data Validation Memo for more detailed requirements.

## **9.0 HEALTH AND SAFETY**

This section should demonstrate compliance with Health and Safety Plan submitted or referenced in either the SSI Technical Memorandum or Workplan by providing field notes and logs. This section of the report should describe the health and safety procedures that were followed in the field, including safety equipment and clothing used (personal protective equipment, level of protection), health and safety meetings, explanation of any hazards encountered, and any instrument readings recorded.

Any deviations from the Health and Safety Plan should also be identified.

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## **10.0 ENVIRONMENTAL MIGRATION SCREENING EVALUATION**

Consistent with the SSI Technical Memorandum or Workplan, this section should present the approach used to evaluate potential impact to groundwater and surface water using tools such as U.S. EPA soil screening values [Reference], criteria developed by the Regional Water Quality Control Boards, leaching models, or leachability tests. Sampling results, contaminant characteristics, and the CSM should be evaluated together to determine the environmental fate and transport of contaminants. Selection of tools should consider the most conservative criteria. If surface water may be impacted, an ecological screening evaluation may be necessary.

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## **11.0 HUMAN HEALTH SCREENING EVALUATION**

[Human and Ecological Risk is preparing Section 11.0]

### **11.1 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN**

#### **11.1.1 Comparison of Site Data with Background**

### **11.2 SCREENING EVALUATION ASSUMPTIONS AND EXPOSURE FACTORS**

#### **11.2.1 Land Use Scenarios**

#### **11.2.2 Exposure Pathways and Media of Exposure**

#### **11.2.3 Chemical Groups**

#### **11.2.4 Exposure Point Concentrations**

#### **11.2.5 Indoor Air Evaluation**

#### **11.2.6 Toxicity Values and Summary Tables**

### **11.3 RISK AND HAZARD CHARACTERIZATION**

#### **11.3.1 Selection of Pathways**

### **11.3.2 Water Pathway**

### **11.3.3 Soil Pathway**

### **11.3.4 Air Pathway**

#### *11.3.4.1 PARTICULATES (OUTDOOR)*

#### *11.3.4.2 VAPOR (OUTDOOR)*

#### *11.3.4.3 VAPOR (INDOOR)*

### **11.3.5 Summary of Risk and Hazard for All Media**

Include summary tables

### **11.3.6 Uncertainty Analysis**

## **11.4 SPECIAL HAZARDOUS MATERIAL CONSIDERATIONS**

### **11.4.1 Anthropogenic**

Consider polynuclear aromatic hydrocarbons, dioxins, and furans.

### **11.4.2 Arsenic**

### **11.4.3 Lead**

Include LeadSpread evaluation.

### **11.4.4 Methane and Hydrogen Sulfide**

Include methane advisory and petrogenic, biogenic, thermogenic sources of hydrogen sulfide.

### **11.4.5 Naturally Occurring Asbestos**

#### 11.4.6 Petroleum Hydrocarbons

#### 11.4.7 Radon

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## 12.0 PUBLIC PARTICIPATION

Public participation activities during the SSI should be described here and may include the following:

- If significant time has elapsed since previous field activities were conducted (e.g. PEA sampling), a fact sheet for SSI field activities may be helpful to keep the public informed.
- If it is reasonably anticipated that a response action will be required for the site, the school district can begin an assessment of community outreach activities conducted to date to help prepare for public participation activities during a response action.

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### **13.0 COMPLIANCE WITH ADDITIONAL REGULATORY REQUIREMENTS**

This section should identify and discuss compliance with additional regulatory requirements identified in the SSI Technical Memorandum or Workplan. This section should also discuss compliance with other regulatory requirements identified after approval of the SSI Technical Memorandum or Workplan.

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## 14.0 FINDINGS

This section should summarize the following findings of the SSI conducted to investigate the areas of concern identified in the PEA::

- Nature and extent of contamination, including the chemicals of concern, media impacted, and horizontal and vertical characterization.
- Fate and transport based on the environmental migration screening evaluation.
- Human health risk based on the human health screening evaluation.

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## 15.0 CONCLUSIONS AND RECOMMENDATIONS

This section of the report should include conclusions that summarize the evaluation of areas of concern identified in the PEA and provide associated recommendations.

This section should shall contain one of the following conclusions and recommendations for the SSI:

- Further investigation is not required.
  - Neither a release of hazardous material nor the presence of a naturally occurring hazardous material which would pose a threat to public health or the environment under unrestricted land use, was indicated at the site.
- Further action is required.
  - A release or threatened release of hazardous material or the presence of a naturally occurring hazardous material, which would pose a threat to public health or the environment under unrestricted land use, exists at the site.

Further action may include an RI/FS or response action, such as a removal or remedial action, is necessary. These actions are conducted in accordance with Health and Safety Code, division 20, chapter 6.8, section 25300 et seq. (Ed. Code § 17213.2, subd. (a)). A brief description of the recommended response action (e.g. excavation) should be provided.

In certain cases, DTSC may consider a partial site approval when a PEA concludes that with the exception of a small isolated area of contamination that requires a response action, a large portion of a site is not impacted. To recommend partial site approval for construction to proceed on portions of the site that are not affected by hazardous materials, all of the following conditions must be met and should be demonstrated in this section (Ed. Code, § 17213.2, subd. (f)(1)):

- Impacted portions of the site have been fully characterized.
- Construction will not interfere with any response action necessary to address the release or threatened release of hazardous materials, or presence of any naturally occurring hazardous materials.
- Site conditions will not pose a significant threat to the health and safety of workers involved with construction.

## 16.0 REFERENCES

The report shall include a references section to identify published referenced sources relied upon in preparing the SSI Report. Each referenced source shall be adequately annotated to facilitate retrieval by another party.

DTSC. 2006b. Data Validation Memorandum, Summary of the Level II Data Validation for Advanced Technology Report ATV5796, dated April 25, 2006." May 2, 2006.

DTSC. 2000. *Draft Site Specific Health and Safety Plan Guidance Document for Site Assessment/Investigation, Site Mitigation Projects, Hazardous Waste Site Work Closure, Post Closure, and Operation and Maintenance Activities*. December 2000.

United States Environmental Protection Agency (U.S. EPA). 1992. *Guide to Management of Investigation-Derived Wastes, Quick Reference Fact Sheet*. Office of Solid Waste and Emergency Response. Publication 9345.3-03FS. January 1992.

## 17.0 SIGNATURE AND QUALIFICATIONS OF RESPONSIBLE PROFESSIONALS

The following requirements exist for specific work that may be conducted during environmental assessments, investigations, or cleanup of school sites:

- All engineering work shall be conducted in compliance with the Professional Engineers Act (Bus. & Prof. Code, § 6700 et seq.) and Rules of the Board for Professional Engineers and Land Surveyors (Cal. Code Regs., tit. 16, § 400 et seq.).
- All geologic work shall be conducted in compliance with the Geologist and Geophysicist Act (Bus. & Prof. Code, § 7800 et seq.) and Rules of the Board for Geologists and Geophysicists (Cal. Code Regs., tit. 16, § 3000 et seq.).
- Contractors engaging in removal or remedial actions must be a licensed hazardous substance contractor with the Contractors' State License Board (Bus. & Prof. Code § 7058.7).

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## **FIGURE 1 SITE LOCATION MAP**

This map should include a north arrow, be to scale, and show the general location of the site relative to its surrounding area, including major highways, surface water bodies, land use, sensitive populations, and critical habitats.

[Include Figure 1 from Appendix B – Phase I.]

## **FIGURE 2 SITE VICINITY MAP**

This map should include a north arrow, be to scale, and be of sufficient detail to show adjacent property uses.

[Include Figure 2 from Appendix B – Phase I.]

## **FIGURE 3 SITE PLAN**

This plan should include a north arrow, and be to scale, and be of sufficient detail to show significant site features, including site boundaries, land use, paved areas, structures, drainage patterns, areas of known or suspected environmental conditions, and recognized environmental conditions.

Copy from Appendix E – PEA Workplan

## **FIGURE 4 AREAS OF CONCERN**

The areas of concern should be clearly shown overlaid onto the site plan.

## **FIGURE 5 CONCEPTUAL SITE MODEL**

Examples of figures used to show the conceptual site model of the site may include, but are not limited to, the following:

- Figure 5A – Potential Exposure Scenarios
- Figure 5B – Iso-concentration Contour Map
- Figure 5C – Groundwater Elevation Contour and Flow Map
- Figure 5D – Geologic Cross-Section

Use of these figures will depend on the complexity of the site.

## **FIGURE 6 SITE PLAN WITH SAMPLING LOCATIONS AND RESULTS**

This figure should show the samples collected and the associated analytical results overlaid onto the Site Plan. The figure should clearly show the sampling locations relative to the areas of recognized environmental conditions. The sample locations,

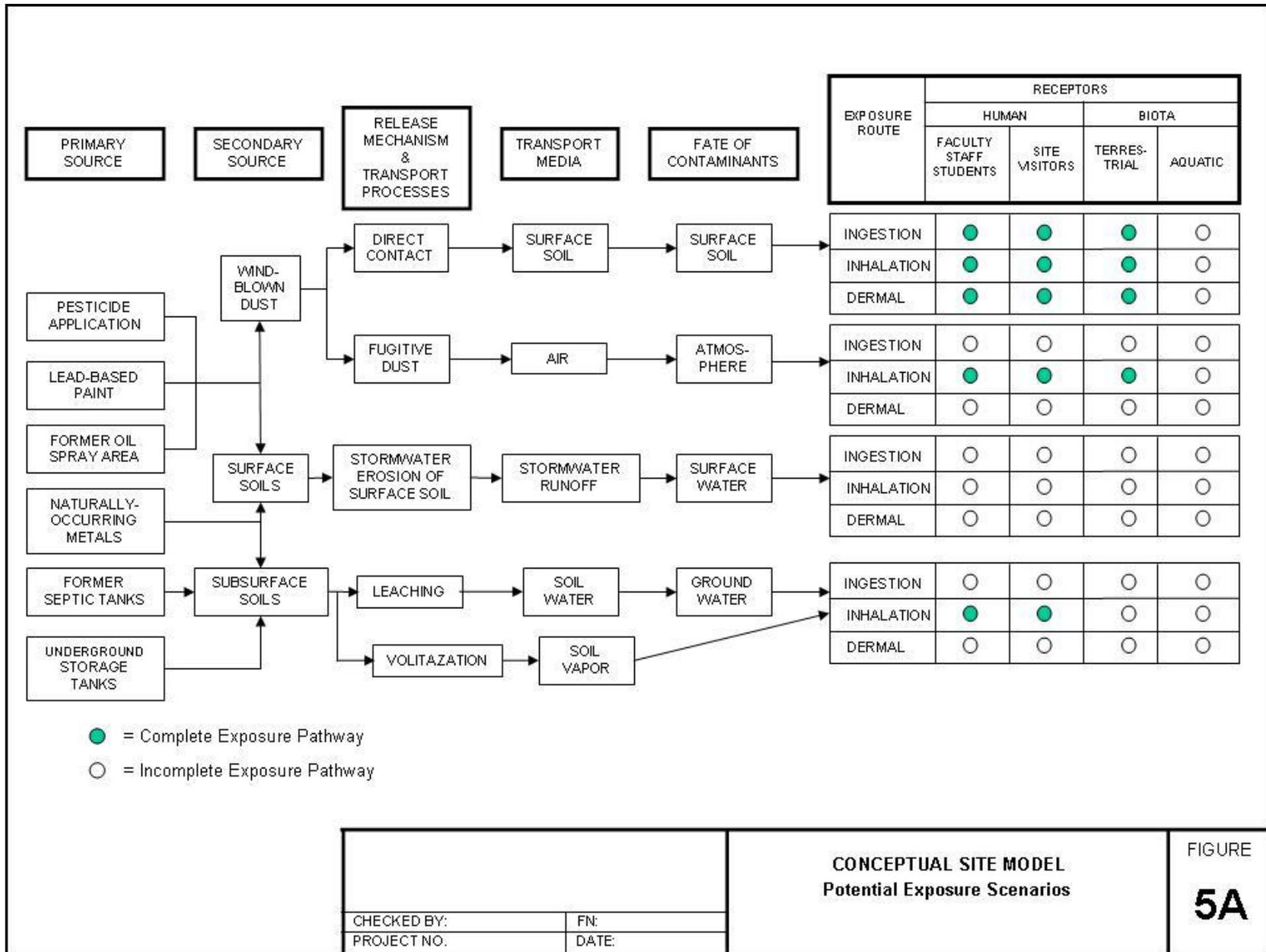
depths, matrix, analytes, detected concentrations, detection limit for non-detect concentrations, and concentration units should be clearly presented.

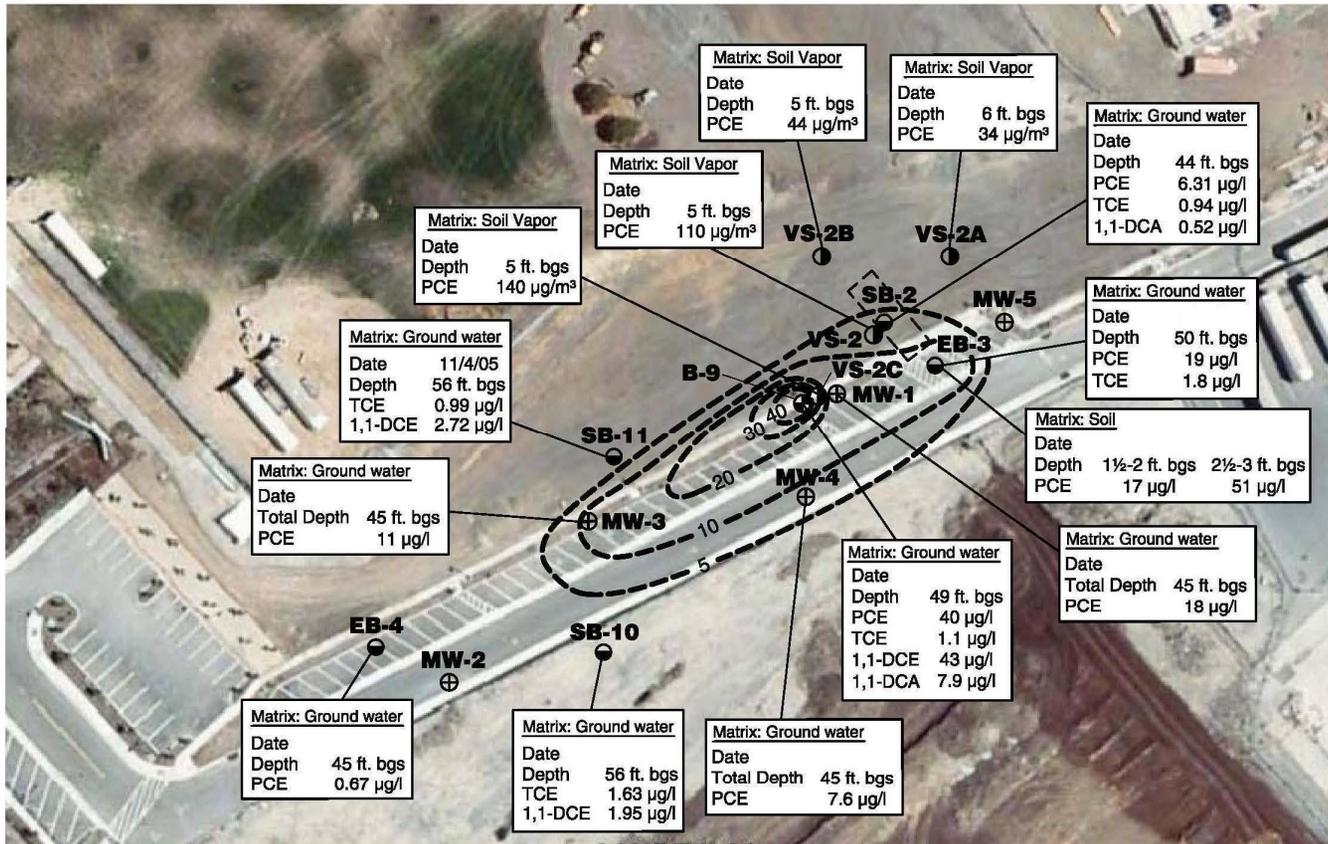
Copy from Appendix F – PEA Report

**FIGURE 7 PROJECT SCHEDULE**

[Include an example.]

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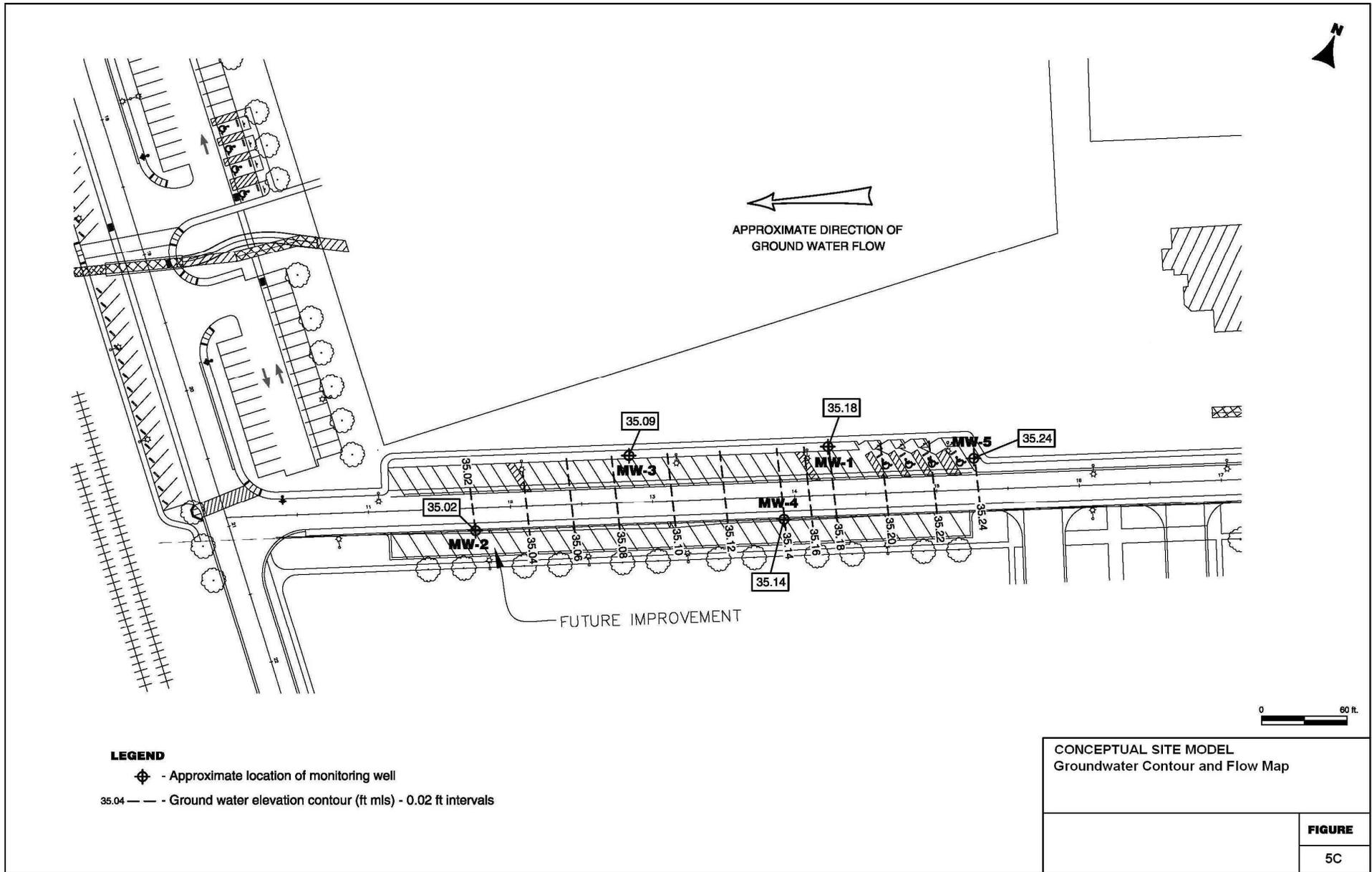
**LEGEND**

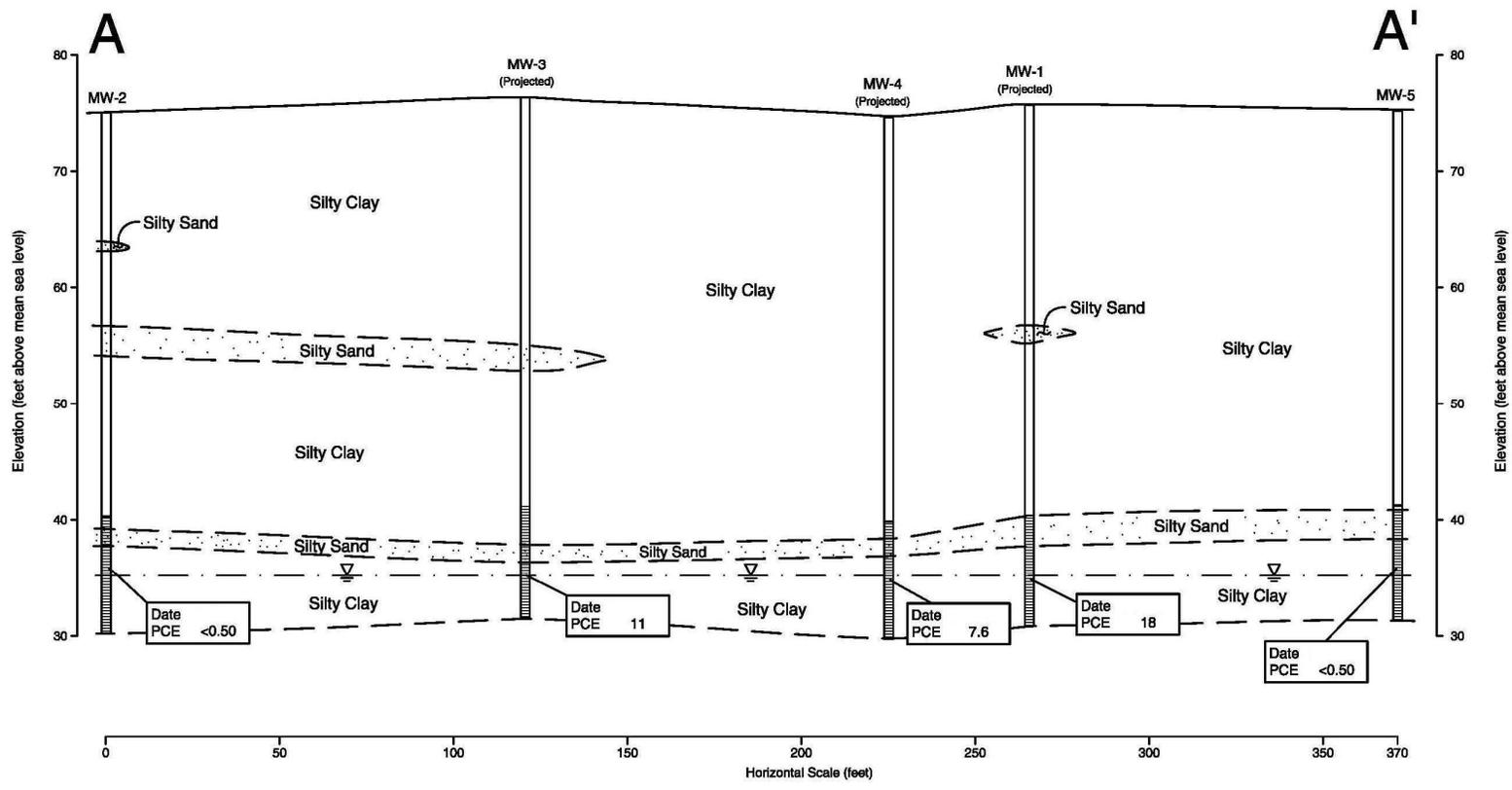
- ⊕ - Approximate location of ground water monitoring well
- ⊙ - Approximate location of soil vapor sample
- - Approximate location of boring
- - Approximate location of boring
- - Former rail spur/solvent compound building
- 10 - Iso-concentration contour of PCE in  $\mu\text{g}/\text{l}$

0 60 ft.

CONCEPTUAL SITE MODEL  
Iso-Concentration Contour Map

<b>FIGURE</b>
5B





**LEGEND**

- Silty Sand
- Silty Clay
- Approximate elevation of water table

CONCEPTUAL SITE MODEL Geologic Cross-Section	
	<b>FIGURE</b>
5D	

**TABLE 1 SUMMARY OF SAMPLING LOCATIONS AND RATIONALE**

Copy Table 1 from Appendix C – Phase I Addendum.

**TABLE 2 SUMMARY OF ANALYTICAL RESULTS**

This table should provide a summary of the analytical results. The analytical method, sample locations, depths, matrix, detected concentrations, detection limit for non-detect concentrations, and units should be clearly presented. The table should also compare results to the screening level for lead and identify the detected concentrations exceeding the screening level.

Copy Table 2 from Appendix C – Phase I Addendum.

**TABLE 3 SUMMARY OF RISK**

Copy Table 3 from Appendix F – PEA Report.

**TABLE 4 SUMMARY OF HAZARD**

Copy Table 4 from Appendix F – PEA Report.

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**APPENDIX A      SITE PHOTOGRAPHS**

Copy description from Appendix B in Appendix C – Phase I Addendum.

**APPENDIX B      FIELD LOGS**

Copy from Appendix F – PEA Report

**APPENDIX C      BORING LOGS**

Copy from Appendix F – PEA Report

**APPENDIX D      X-RAY FLUORESCENCE DATA REPORTS**

Copy description from Appendix D in Appendix C – Phase I Addendum.

**APPENDIX E      LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION**

Copy description from Appendix E in Appendix C – Phase I Addendum.

**APPENDIX F      DATA VALIDATION MEMORANDUM**

Copy description from Appendix F in Appendix C – Phase I Addendum.

**APPENDIX G      WASTE MANAGEMENT DOCUMENTATION**

Uniform hazardous waste manifests or bill of lading for investigation-derived waste should be included and referenced in the text.

**APPENDIX H      COPIES OF PUBLIC NOTICES**