Appendix H
Quality Assurance Project Plan

Appendices

QUALITY ASSURANCE PROJECT PLAN FOR:

PROPOSED IRVINE UNIFIED SCHOOL DISTRICT HIGH SCHOOL #5

prepared for:

IRVINE UNIFIED SCHOOL DISTRICT

Contact:
Dana Grudem

prepared by:

THE PLANNING CENTER|DC&E

Contact:
Denise Clendening, Ph.D., Director of Site Assessment Services

NOVEMBER 2013

QUALITY ASSURANCE PROJECT PLAN FOR:

PROPOSED IRVINE

UNIFIED SCHOOL

DISTRICT HIGH

SCHOOL #5

prepared for:

IRVINE UNIFIED SCHOOL DISTRICT

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This Quality Assurance Project Plan (QAPP) has been prepared by The Planning Center|DC&E on behalf of Irvine Unified School District (District) to address quality assurance (QA) and quality control (QC) policies associated with the collection of environmental data at the Proposed Irvine USD High School 5 (site), in Irvine, California. Together with the Workplan, this QAPP presents the plan for sampling and analysis as part of the investigation. U.S. Environmental Protection Agency (USEPA) policy requires a QAPP for all environmental data collection projects mandated or supported by the USEPA through regulations or other formalized means (USEPA 1998a). The purpose of this QAPP is to identify the methods to be employed to establish technical accuracy, precision, and validity of data that is generated at the site.

The sampling program is formally described in the Workplan. This QAPP contains general and specific details regarding field sampling, laboratory, and analytical procedures that apply to activities described in the Workplan. It provides field and laboratory personnel with instructions regarding activities to be performed before, during, and after field investigations. These instructions will insure data collected for use in project decisions will be of the type and quality required to meet the data quality objectives (DQOs) for the project.

Guidelines followed in the preparation of this QAPP are described in EPA Requirements for Quality Assurance Plans for Environmental Data Operations, External Review Draft Final, EPA QA/R-5 (USEPA 1998a) and EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 (USEPA 1998b). Other documents that have been referenced in this plan include, Guidance for the Data Quality Objectives Process, EPA QA/G-4 (USEPA 1994a) and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (USEPA SW-846, Third Edition, 1996).

PROJECT HISTORY AND OBJECTIVES

The project site is located in the City of Irvine, Orange County, California. The site consists of vacant land south of the intersection of Irvine Boulevard and Desert Storm Drive. Figure 2 of the Workplan shows the existing site conditions.

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SECTION 1. PROJECT DESCRIPTION

This section presents information concerning the proposed sampling activities, selected analytical parameters, data quality objectives, and the resulting project decisions. A separate Workplan provides specifications for field activities.

1.1 ANALYTICAL SCOPE

The planned sampling effort includes the sampling and analysis of shallow soils for a list of potential hazardous substances. A detailed plan of this investigation is provided in the site-specific Workplan, and includes specified numbers and locations of samples to be collected. The Workplan also provides specific procedures for sample collection at designated locations. Samples will be collected in accordance with methods presented in the Workplan.

Soil samples will be collected on the project area in accordance with the protocols detailed in the DTSC's PEA Guidance Manual (DTSC 1999).

The appropriate analyses selected for this field program, and the rationale for selection of these parameters, are further provided in the Workplan. Advanced Technology Laboratories, Inc. (ATL), located in Signal Hill, California, will perform testing of soil samples. H&P Mobile Geochemistry based in Carlsbad, California is anticipated to perform on-site testing of soil gas samples.

1.2 DATA USE

Decisions to be made based upon the planned sampling and analysis effort will be determined by the data compiled from the sampling and analysis program. It is intended that data collected through implementation of this QAPP will satisfy federal, state, and local data quality requirements. These data may be used to characterize the nature and extent of contamination, support risk assessment, support the evaluation of corrective/remedial action, and/or assist in determination of additional actions.

The presence of environmental contaminants will be determined by the extent of valid detectable concentrations of the constituents discussed above. If the data associated with any detections of chemicals of potential concern (COPCs) are confirmed, the data will be used to assess risk using accepted methods for determining potential carcinogenic and non-carcinogenic exposures. If results from the risk screening evaluations indicate no risks of exposure with respect to the use of the property, then the District will use the data to support No Further Action consent from DTSC, and the proposed development may continue without modification. If the evaluation indicates unacceptable risks of exposure, then the data can be used by District for further consideration of action.

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SECTION 2. PROJECT ORGANIZATION

This section provides a description of the organizational structure and responsibilities of the individual positions for this project. This description defines the lines of communication and identifies key personnel assigned to various activities for the project.

2.1 IRVINE UNIFIED SCHOOL DISTRICT

Ms. Dana Grudem is the designated contact person for the District. Ms. Grudem will be responsible for the directional decisions, as well as budget control, and for work conducted at the school site. Ms. Grudem, or designee, may perform document review of related work plans, reports, and drawings for activities associated with this project.

2.2 THE PLANNING CENTER|DC&E

The investigation contractor has responsibility for assigned phases of investigation and reporting. Together the management team (Project Manager and Field Manager) will be responsible for the technical planning and implementation of the work prescribed in the site-specific Workplan. The QA staff has responsibility for effective planning, verification and management of QA activities associated with the assigned project.

Dr. Denise Clendening is The Planning Center|DC&E Project Manager and will serve as the primary contact with the DTSC and the District. Her responsibilities include strategy development, budget control, document control, project management, risk assessment and document review.

Mr. Michael Watson of The Planning Center|DC&E is a Professional Geologist in the State of California. Mr. Watson's responsibilities include field activities and preparation of required reports and data validation including quality assurance/quality control.

2.3 LABORATORY

The primary offsite laboratory is anticipated to be ATL in Signal Hill, California. ATL will perform analytical testing for soil samples collected for this investigation. The primary onsite laboratory is anticipated to be H&P Mobile Geochemistry based in Carlsbad, California. H&P will perform analytical testing for soil gas samples collected for this investigation. The respective laboratory's project manager will report to The Planning Center|DC&E Field Manager on all aspects of the sample analysis. In addition, The Planning Center|DC&E QA Manager will be advised of any matters related to data quality during the course of the investigation.

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SECTION 3. DATA QUALITY OBJECTIVES

DQOs have been specified for each data collection activity. The project work will be conducted and documented so that the data collected are of sufficient quality for their intended use (USEPA 1998). DQOs specify the data type, quality, quantity, and uses needed to make decisions, and are the basis for designing data collection activities. The DQOs have been used to design the data collection activities presented in the Workplan. The DQOs for the project are discussed in the following sections.

3.1 DATA QUALITY OBJECTIVES

The project DQOs developed specifically for the planned sampling and analysis program have been determined based on USEPA's seven-step DQO process (USEPA 1994a). The Project Manager will evaluate the DQOs to determine if the quantitative and qualitative needs of the sampling and analysis program have been met. The project definition associated with each step of the DQO process can be summarized as follows:

State the problem: The purpose of the sampling program is to determine if the proposed site is acceptable for the development of a new educational facility. Although the proposed development of the site will result in asphalt or concrete surfacing over the majority of the site, exposed soils will exist in landscaped areas where students could come into contact. Previous investigations have not performed a complete evaluation of potential contamination based on historical use of the property.

Identify the Decision: The data obtained from the sampling and testing activities will be used to evaluate if releases of hazardous substances from historical uses have occurred at the site. The investigative results will be further evaluated to determine to what extent any contamination identified will result in risk of exposure. The results will be compiled and used to assess the relative threat associated with any contamination identified, through a baseline risk assessment. Based on the calculation of human health and ecological risks for the site, the suitability of the property for its intended development will be determined.

Identify Inputs to the Decision: Inputs to the decision will include results of analytical testing of soil gas samples, and shallow soils from selected locations on the site. Each of these matrices will be tested for the specified analytes discussed in Section II.

Define the Study Boundaries: The boundaries of the field sampling and analysis program will be the perimeter of the site as discussed above and detailed in the Workplan.

Develop a Decision Rule: Decisions will be based upon laboratory results for the target constituents presented in Tables 1 through 3 for each respective matrix tested. If no valid detectable concentrations of target compounds are reported for the given samples, then a decision will be made that the site is fully characterized with respect to the compounds tested and no further sampling will be required as part of this investigation. If target constituents are detected in the samples tested, then the data will be compiled for use in calculating the human health and ecological risk of exposure. The results of the risk evaluation will be used by the District to support a No Further Action consent from DTSC, if the data indicate risk is acceptable.

Specify Limits on Decision Error: The results of all analytical testing will be subjected to data validation specified in Section 7.3. Data are determined to be valid if the specified DQOs for precision, accuracy, representativeness, comparability and completeness are achieved. The results of any detected target constituents will be considered in evaluating the need for additional sampling of soil gas and/or site soil, and assessing the necessity for reducing any risks posed by the potential contamination.

Optimize the Design: The field sampling program has been designed to provide the type and quantity of data needed to satisfy each of the aforementioned objectives. A separate Workplan provides the specifications for the data collection activities, including the numbers of samples, respective locations, and sampling techniques. The quality of the data will be assessed through the procedures further described in this QAPP.

3.2 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY AND COMPLETENESS

The basis for assessing the elements of data quality is discussed in the following subsections. In the absence of laboratory specific precision and accuracy limits, the QC limits listed in this section must be met.

3.2.1 Precision

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions.

Analytical precision is a measurement of the variability associated with duplicate or replicate analyses of the same sample in the laboratory. Precision is assessed by analysis of the results between laboratory quality control sample pairs. These include laboratory control sample (LCS) and LCS duplicates, matrix spike (MS) and MS duplicates (MSD), or sample duplicates. If the recoveries of analytes in the specified control samples pairs are comparable within established control limits, then precision criteria are satisfied.

Total precision is a measurement of the variability associated with the entire sampling and analytical process. It is determined by analysis of duplicate (two) or replicate (more than two) field samples, and measures variability introduced by both the laboratory and field operations. Field duplicate samples are analyzed to assess combined field and analytical precision.

Duplicate results are assessed using the relative percent difference (RPD) between duplicate measurements. If the RPD for laboratory quality control samples exceeds 30 percent, data will be qualified as described in the applicable validation procedure. If the RPD between primary and duplicate field samples exceeds 100 percent for soil or soil gas, data will be qualified as described in the applicable validation procedure.

The RPD is calculated as the difference between the two sample results (absolute value) divided by the average of the two sample results. The equation can be expressed as follows:

$$\%RPD = 200 \times ((x2-x1) / (x2+x1))$$

3.2.2 Accuracy

Accuracy is a statistical measurement of correctness of a measured value, and includes components of random error (variability due to imprecision) and systematic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value of a known concentration, spike, or standard.

Accuracy of laboratory analyses will be assessed by LCS recoveries, surrogate standard recoveries, MS spike recoveries, and initial and continuing calibrations of instruments. Laboratory accuracy is expressed as the percent recovery (%R). Accuracy limits are statistically

generated by the laboratory or required by specified USEPA methods. If the percent recovery is determined to be outside of acceptance criteria, data will be qualified as described in the applicable validation procedure. The calculation of percent recovery is provided below:

$$\% R = 100 \times (Xs-X)/T$$

where Xs is the measured value of the spiked sample, X is the measured value of the unspiked sample, and T is the true value of the spike solution added.

Accuracy is also assessed by the analysis of laboratory and field blanks. Assessment of blank results provides information regarding potential bias imparted to analytical results from measurement systems and/or field conditions. Field accuracy will be assessed through the analysis of field equipment blanks. Analysis of field blanks documents bias associated with the sampling process, field contamination, sample preservation, and sample handling. The DQO for field equipment and trip blanks is that all values are less than the reporting limit for each target constituent. If contamination is reported in the field equipment or trip blanks, data will be qualified as described in the applicable validation procedure.

3.2.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent selected characteristics of the media sampled. Representativeness of data collection is addressed by careful preparation of sampling and analysis programs. This QAPP, together with the Workplan, address representativeness by specifying sufficient and proper numbers and locations of samples; incorporating appropriate sampling methodologies; specifying proper sample collection techniques and decontamination procedures; selecting appropriate laboratory methods to prepare and analyze soil and soil gas; and establishing proper field and laboratory QA/QC procedures.

3.2.4 Completeness

Completeness is the measure of valid data obtained compared to the amount that was expected under ideal conditions. The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The objective for completeness is to obtain at least 90 percent of the planned data to support evaluation and assessment efforts. Specifically, for background samples, a completeness requirement of 100 percent is mandated. The formula for calculation of completeness is presented, as follows:

$$\% \text{ Completeness} = 100 \times \frac{\text{number of valid results}}{\text{number of expected results}}$$

3.2.5 Comparability

Comparability is an expression of confidence with which one data set can be compared to another. The objective of comparability is to ensure that data developed during the investigation are comparable with data previously collected (i.e., methods of analysis are comparable), and that the methods used adequately address applicable criteria or standards established by the USEPA and California Department of Health Services (CADHS). This QAPP addresses comparability by specifying laboratory methods that are consistent with the current standards of practice as approved by the USEPA and CADHS. Field methods are discussed in the Workplan.

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SECTION 4. QUALITY CONTROL ELEMENTS

This section presents QC requirements relevant to analysis of environmental samples that will be followed during all project analytical activities. The purpose of the QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials.

4.1 QUALITY CONTROL ELEMENTS

The chemical data to be collected for this effort will be used to determine that the extent of contamination is properly evaluated. As such, it is critical that the chemical data is documented to be of the highest confidence and quality. Consequently, strict QA/QC procedures will be adhered to. These procedures include:

Adherence to protocols for field sampling and decontamination procedures;

Collection and laboratory analysis of appropriate field and equipment blanks to monitor for contamination of samples in the field or the laboratory;

Collection and laboratory analysis of site specific matrix spike, matrix spike duplicate, and blind duplicate samples to evaluate precision and accuracy; and

Attainment of completeness goals.

4.1.1 Equipment Decontamination

Non-dedicated equipment will be decontaminated before and after each sample is collected. The equipment will be washed in a non-phosphate detergent and potable water, rinsed in potable water, and then double rinsed in distilled water. A description of the specific methodologies to be followed to maximize proper decontamination of non-dedicated sampling equipment is provided in the Workplan.

4.1.2 Standards

Standards used for calibration or to prepare samples will be certified by National Institute of Standards and Technology (NIST), USEPA, or other equivalent source. The standards will be current. The expiration date will be established by the manufacturer, or based on chemical stability, the possibility of contamination, and environmental and storage conditions. Standards will be labeled with expiration dates, and will reference primary standard sources if applicable. Expired standards will be discarded.

4.1.3 Supplies

All supplies will be inspected prior to their use in the field or laboratory. The descriptions for sample collection and analysis contained in the methods will be used as a guideline for establishing the acceptance criteria for supplies. A current inventory and appropriate storage system for these materials will assure their integrity prior to use.

4.1.4 Holding Time Compliance

Sample preparation and analysis will be completed within the required method holding times (Table 1). Holding time begins at the time of sample collection. If holding times are exceeded, and the analyses are performed, the associated results will be qualified as described in the applicable validation procedure. The following definitions of extraction and analysis compliance are used to assess holding times:

Preparation or extraction completion - completion of the sample preparation process as described in the applicable method, prior to any necessary extract cleanup.

Analysis completion - completion of all analytical runs, including dilutions, second-column confirmations, and any required re-analyses.

4.1.5 Preventative Maintenance

The Field Manager for The Planning Center|DC&E is responsible for documenting the maintenance of all field equipment prescribed in the manufacturer's specifications. Scheduled maintenance will be performed by trained personnel. Procedures specific to the calibration, use and maintenance of field equipment are presented in the Workplan. The analytical laboratory is responsible for all analytical equipment calibration and maintenance as described in their laboratory QA Plan. Subcontractors are responsible for maintenance of all equipment needed to carry out subcontracted duties.

4.2 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) SAMPLES

The purpose of this QA/QC program is to produce data of known quality that satisfy the project objectives and that meet or exceed the requirements of the standard methods of analysis. This program provides a mechanism for ongoing control and evaluation of data quality measurements through the use of QC materials. Quality assurance and quality control samples will be collected as part of the overall QA/QC program.

4.2.1 Laboratory Reagent Blanks

A laboratory reagent blank is de-ionized, distilled water that is extracted by the laboratory and analyzed as a sample. Analysis of the reagent blank indicates potential sources of contamination from laboratory procedures (e.g., contaminated reagents, improperly cleaned laboratory equipment, or persistent contamination due to presence of certain compounds in the ambient laboratory air). A reagent blank will be analyzed at least once each day for each method utilized by the laboratory for that day.

4.2.2 Field Equipment Blanks

A field equipment blank is a sample that is prepared in the field by pouring de-ionized, distilled water into cleaned sampling equipment. The water is then collected and analyzed as a sample. Field equipment blanks are typically blind (given a fictitious name so that the laboratory will not recognize it as a blank). The field equipment blank gives an indication of contamination from field procedures (e.g., improperly cleaned sampling equipment, cross-contamination). Field equipment blanks will be collected at a minimum frequency of at least one per ten, or 10 percent of primary field samples when non-dedicated equipment is utilized. The field equipment blanks should be analyzed using the same analyses requested for the associated primary samples collected.

4.2.3 Trip Blanks

The primary purpose of trip blanks is to detect potential additional sources of contamination that could potentially influence contaminant values reported in field samples, both quantitatively and qualitatively. Trip blanks serve as a mechanism of control for sample bottle preparation, blank water quality and sample handling. They are generally submitted to the laboratory for analysis of VOCs. Since no VOCs are anticipated to be detected at this site, no trip blanks were included as part of the sampling program.

4.2.4 Matrix Spike Samples

Matrix spikes are performed by the analytical laboratory to evaluate the efficiency of the sample extraction and analysis procedures, and are necessary because matrix interference (interferences from non-target compound in the sample matrix, water or soil) may have a widely varying impact on the accuracy and precision of the extraction analysis. The matrix spike is prepared by the addition of known quantities of target compounds to a sample. The sample is extracted and analyzed. The results of the analysis are compared with the known additions and a matrix spike recovery is calculated giving an evaluation of the accuracy of the extraction and analysis procedures. Matrix spike recoveries are reviewed to check that they are within acceptable range. However, the acceptable ranges vary widely with both sample matrix and analytical method. Matrix spikes and matrix spike duplicates will be analyzed by the laboratory at a frequency of at least one per twenty, or 5 percent of the primary field samples. Typically, matrix spikes are performed in duplicate in order to evaluate the precision of the procedures as well as the accuracy. Precision objectives (represented by agreement between matrix spike and matrix spike duplicate recoveries) and accuracy objectives (represented by matrix spike recovery results) are based on statistically generated limits established annually by the analytical laboratory. It is important to note that these objectives are to be viewed as goals, not as criteria. If matrix bias is suspected, the associated data will be qualified and the direction of the bias indicated in the data validation report.

4.2.5 Field Duplicate Samples

Field duplicate samples will be collected and analyzed to evaluate sampling and analytical precision. Field duplicates are collected and analyzed in the same manner as the primary samples. Agreement between duplicate sample results will indicate good sampling and analytical precision. Specific locations will be designated for collection of field duplicates prior to the start of field activities. Field duplicates will be collected at a frequency of 10 percent of the primary samples collected. The duplicate sample will be analyzed for all laboratory analyses requested for the primary sample collected. The precision goal for field duplicates analyses will be plus or minus 50 percent relative percent difference for aqueous samples and plus or minus 100 percent relative percent difference for soil, or air samples. Results for samples exceeding these goals will be qualified as estimated. Professional judgement will be used to determine if all samples in the associated batch will be qualified as well.

4.2.6 Performance Evaluation Samples

Double blind performance evaluation (PE) samples may be submitted to the analytical laboratory during any site investigation. These samples may be of water or soil matrix, and are used to assess the accuracy of analytical procedures employed for a given sample set. PE samples will be used if questionable data quality is suspected as determined during laboratory audits or data validation.

If used, double blind PE samples will be prepared by Environmental Resources Standards, or similar supplier, in similar sample containers as the project field samples and shipped from the field to the laboratory for analysis.

Double blind PE samples will be prepared using NIST and/or A2LA certified standards. The project-specific PE samples will contain known concentrations of the analytes of interest. Laboratory results will be evaluated against the original Certificates of Analyses for precision and accuracy. PE samples may be submitted for analysis as part of the laboratory pre-qualification process, or as part of a given sampling event. Results will be reported to the laboratory and presented with associated field sample results.

SECTION 5. SAMPLING PROCEDURES

The defensibility of data is dependent on the use of well defined, accepted sampling procedures. This section describes the sampling and handling procedures that will be followed for each sampling event.

5.1 SAMPLING PROCEDURES

Collection of high integrity environmental samples is important to the quality of chemical data to be generated. To this end, detailed field procedures have been developed to guide sample collections during each phase of the field investigation. These procedures are contained in the Workplan.

5.1.1 Sample Containers, Preservation and Holding Times

Table 1 lists the required sample containers, preservatives, and recommended maximum holding times for samples. Sample containers provided by the laboratory will be new, and purchased commercially from I-Chem, Eagle Pitcher, or other equivalent validated sources.

5.1.2 Sample Handling and Storage

In the field, each sample container will be marked with the sampling location number, and date and time of sample collection. All sample containers will be wiped with paper towels and securely packed, in a cooler on ice, in preparation for delivery to the laboratory.

Upon receipt of the samples, the laboratory will immediately notify the Field Manager if conditions or problems are identified which require immediate resolution. Such conditions include container breakage, missing or improper chain-of-custody, exceeded holding times, improper preservation, missing or illegible sample labeling, or temperature excursions.

5.1.3 Sample Custody

For each sample that is submitted to the laboratory for analysis, an entry will be made on a chain-of-custody form supplied by the laboratory. The information to be recorded includes the sampling date and time, sample identification number, matrix type, requested analyses and methods, preservatives, and the sampler's name. Sampling team members will maintain custody of the samples until they are relinquished to laboratory personnel or a professional courier service. The chain-of-custody form will accompany the samples from the time of collection until received by the laboratory. Each party in possession of the samples (except the professional courier service) will sign the chain-of-custody form signifying receipt.

The chain-of-custody form will be placed in a plastic bag and shipped with samples inside the cooler. After the samples, ice, and chain-of-custody forms are packed in the coolers, the cooler will be appropriately sealed before it is relinquished to the courier. A copy of the original completed form will be provided by the laboratory along with the report of results. Upon receipt, the laboratory will inspect the condition of the sample containers and report the information on chain-of-custody or similar form.

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SECTION 6. ANALYTICAL PROCEDURES

The analytical methods used for this project are primarily USEPA approved methods and are listed in Tables 1 through 3. Specific analytical method procedures are detailed in the laboratory QA Plan and standard operating procedures (SOPs) of the selected laboratory. These documents may be reviewed by The Planning Center|DC&E quality assurance staff during laboratory audits to ensure that project specifications are met. Laboratory audits are discussed in Section 8.2.

6.1 INTERNAL STANDARDS

Internal standards are measured amounts of method-specified compounds added after preparation, or extraction, of a sample. Internal standards are added to samples, controls, and blanks in accordance with method requirements to identify column injection losses, purging losses, or viscosity effects.

Acceptance limits for internal standard recoveries are set forth in the applicable method. If the internal standard recovery falls outside of acceptance criteria, the instrument will be checked for malfunction and reanalysis of the sample will be performed after any problems are resolved.

6.2 RETENTION TIME WINDOWS

Retention time windows will be established as described in SW-846 Method 8000A for applicable analyses of organic compounds. Retention time windows are used for qualitative identification of analytes and are calculated based on multiple, replicated analyses of a respective standard.

Retention times will be checked on a daily basis. Acceptance criteria for retention time windows are established in the referenced method. If the retention time falls outside the respective window, actions will be taken to correct the problem. The instrument must be re-calibrated after any retention time window failure and the affected samples must be reanalyzed.

6.3 METHOD DETECTION LIMITS

The method detection limit (MDL) is the minimum concentration of an analyte, or compound, that can be measured and reported with 99 percent confidence that the concentration is greater than zero. MDLs are established for each method, matrix and analyte, and for each instrument used to analyze project samples. MDLs are derived using the procedures described in 40CFR 136 Appendix B (USEPA 1990a). USEPA requires that MDLs be established on an annual basis. MDLs must be less than applicable reporting limits for each target analyte presented in Tables 2 and 3.

6.4 INSTRMENT CALIBRATION

Analytical instruments will be calibrated in accordance with the procedures specified in the applicable method. All analytes that are reported shall be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified in the reference method. Records of standard preparation and instrument calibration will be maintained. Records shall unambiguously trace the preparation of standards and their use in calibration and quantitation of sample results. Calibration records will be traceable to standard materials as described in Section 4.2.

At the onset of analysis, instrument calibrations will be checked using all of the analytes of interest. This applies equally to multi-response analytes. At a minimum, calibration criteria will satisfy method requirements. Analyte concentrations can be determined with either calibration curves or response

factors, as defined in the method. Guidance provided in SW-846 should be considered to determine appropriate evaluation procedures.

SECTION 7. DATA REPORTING

This section presents reporting requirements relevant to the data produced during all project analytical activities.

7.1 FIELD DATA

Data measured by field instruments will be recorded in field notebooks, laptops, and/or on required field forms. Units of measure for field analyses are identified on the field forms. The field data will be reviewed by the Project or Field Manager to evaluate completeness of the field records and appropriateness of the field methods employed. All field records will be retained in the project files.

7.2 LABORATORY DATA

Analytical data will contain the necessary sample results and quality control data to evaluate the data quality objectives defined for the project. Documentation requirements for laboratory data are defined in USEPA Region IX Laboratory Documentation Requirements for Data Validation (USEPA 1990b). The laboratory reports will be consistent with USEPA Level III documentation and include the following data and summary forms:

Narrative, cross-reference, chain-of-custody, and method references;

Analytical results;

Surrogate recoveries (as applicable);

Calibration summary;

Blank results;

Laboratory control sample recoveries;

Duplicate sample results or duplicate spike recoveries;

Sample spike recoveries;

Instrument tuning summary;

Associated raw data; and

Magnetic tape or equivalent upon request.

Data validation criteria are derived from the USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (USEPA 1994b and 1994c). The Functional Guidelines provide specific data validation criteria that can be applied to data generated for this investigation.

The laboratory data will be reviewed for compliance with the applicable method and the quality of the data reported. The following summarizes the areas of data validation.

Holding Times;

Calibrations;

Blanks;

Laboratory Control Samples;

Matrix Spike/Matrix Spike Duplicates;

Surrogates/Internal Standards (as applicable);

Field Quality Control Samples; and

Compound Identification and Quantification.

The application of data validation criteria is a function of project-specific DQOs. The QA/QC Manager will determine if the data quality objectives for the analytical data have been met. Results of the data validation review will be documented and summarized in the investigation.

7.3 PROCEDURES FOR DATA VALIDATION

Procedures for performing data validation for the types of analyses to be performed for this investigation are documented in the National Functional Guidelines. Data validation will be documented in a manner consistent with the functional guidelines. The results of the data validation will be included in a Data Validation Memorandum. This documentation will be maintained by The Planning Center|DC&E in the project files.

7.3.1 Data Qualifiers

The data validation procedures were designed to review each data set and identify biases inherent to the data and determine its usefulness. Data validation flags are applied to those sample results that fall outside of specified tolerance limits, and, therefore, did not meet the program's quality assurance objectives described in Section 3.2. Data validation flags to be used for this project are defined in the National Functional Guidelines. Data validation flags will indicate if results are considered quantitative, estimated, or rejected. Only rejected data are considered unusable for decision-making purposes; however, other qualified data may require further verification.

7.3.2 Project Data Management

Data management is the process of organizing, maintaining, and applying a variety of data to provide a useful and coherent view of the site conditions. Data collected for this investigation include sample collection data, field measurement data, onsite laboratory analytical data, and offsite laboratory analytical data. The data management resources include staff to review and maintain project data, a computerized data management system, and a documentation filing system. The project database management system has the capability to maintain the relationship between sampling locations, samples collected, and filed and laboratory analytical results.

SECTION 8. PERFORMANCE AND SYSTEM AUDITS

Audit programs are established and directed by The Planning Center|DC&E quality assurance staff to ensure that field and laboratory activities are performed in compliance with project controlling documents. This section describes responsibilities, requirements and methods for scheduling, conducting and documenting audits of field and laboratory activities.

8.1 FIELD AUDITS

Field audits focus on appropriateness of personnel assignments and expertise, availability of field equipment, adherence to project controlling documents for sample collection and identification, sample handling and transport, use of QA samples, chain of custody procedures, equipment decontamination and documentation. Field audits are not required, but may be performed in the event significant discrepancies are identified that warrant evaluation of field practices.

8.2 LABORATORY AUDITS

Laboratory audits include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, QA/QC protocols, and data reporting. Any selected mobile or offsite laboratory will be licensed by the State of California as a certified testing laboratory. If no previous audit has been conducted by The Planning Center|DC&E, a scheduled audit will be conducted by the quality assurance staff during the course of this project to ensure the integrity of sample handling and processing by the laboratory.

8.3 DATA AUDITS

Data audits will be performed on analytical results received from the laboratories. These audits will be accomplished through the process of data validation as described in Section 7.3, or may involve a more detailed review of laboratory analytical results. Data audits require the laboratory to submit complete raw data files to The Planning Center|DC&E for validation. The Planning Center|DC&E chemists will perform a review of the data consistent with the level of effort described in the National Functional Guidelines (USEPA 1994 b and c). This level of validation consists of a detailed review of sample data, including verification of data calculations for calibration and quality control samples to assess if these data are consistent with method requirements. Upon request, the laboratory will make available all supporting documentation in a timely fashion.

8.4 REPORTS TO MANAGEMENT AND RESPONSIBILITIES

Upon completion of any audit, the auditor will submit to the Project Manager and Field Manager a report or memorandum describing any problems or deficiencies identified during the audit. It is the responsibility of the Project Manager to determine if the deviations will result in any adverse effect on the project conclusions. If it is determined that corrective action is necessary, procedures outlined in Section 8.5 will be followed.

8.5 CORRECTIVE ACTION

Corrective actions will be initiated whenever data quality indicators suggest that DQOs have not been met. Corrective actions will begin with identifying the source of the problem. Potential problem sources include failure to adhere to method procedures, improper data reduction, equipment malfunctions, or systemic contamination. The first level of responsibility for identifying the problems and initiating corrective action lies with the analyst/field personnel. The second level of responsibility lies with any

person reviewing the data. Corrective actions may include more intensive staff training, equipment repair followed by a more intensive preventive maintenance program, or removal of the source of systemic contamination. Once resolved, the corrective action procedure will be fully documented, and if DQOs were not met, the samples in question must be recollected and/or reanalyzed utilizing a properly functioning system (USEPA 1998).

REFERENCES

1. USEPA, 1990a. Code of Federal Regulations, Title 40 – Protection of Environment. Office of the Federal Register. U.S. National Archives and Records Administration, Washington, D.C.
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3. USEPA, 1994a. Guidance for the Data Quality Objectives Process. EPA QA/G-4. Office of Research and Development U.S. Environmental Protection Agency. Washington, D.C.
4. USEPA, 1994b. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA540/R-94/013. Office of Emergency and Remedial Response. Washington, D.C.
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6. USEPA, 1996. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846, Third Edition, Office of Solid Waste and Emergency Response U.S. Environmental Protection Agency. Washington, D.C.
7. USEPA, 1998a. EPA Guidance for Quality Assurance Project Plans. EPA QA/G-5. Office of Research and Development U.S. Environmental Protection Agency. Washington, D.C.
8. USEPA, 1998b. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, External Review Draft Final. EPA QA/R-5. Washington, D.C

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Table 1
Sample Containers, Preservatives, and Holding Times
High School 5
South of Irvine Blvd and Desert Storm Dr
Irvine Unified School District
Irvine, California

Analyte	Method	Container	Preservative	Holding Time
SOIL ANALYSES				
Organochlorine Pesticides	EPA 8081A	4 oz glass or sleeve	4oC	14 days to extraction, 40 days to analysis
Total Petroleum Hydrocarbon Chains	EPA 8015M	4 oz glass or sleeve	4oC	14 days
Polycyclic Aromatic Hydrocarbons	EPA 8270 SIM	4 oz glass or sleeve	4oC	14 days to extraction, 40 days to analysis
Dioxins and Furans	EPA 8290	4 oz glass or sleeve	4oC	30 days to extraction, 45 days to analysis
Polychlorinated Biphenyls	EPA 8082	4 oz glass or sleeve	4oC	14 days to extraction, 40 days to analysis
Title 22 Metals	EPA 6010B	4 oz glass or sleeve	4oC	180 days
Mercury	EPA 7471A	4 oz glass or sleeve	4oC	28 days
SOIL GAS ANALYSES				
Volatile Organic Compounds	EPA 8260B	2-100 ml glass syringes	n/a	30 minutes
Methane	ASTM D1946	50 ml glass syringe	n/a	30 minutes
Hydrogen Sulfide	Jerome 631-x	Direct reading	n/a	n/a

Notes:
The laboratory will freeze all samples after extraction and all archived samples immediately.
No deterioration of frozen samples is expected during the time period required to complete the investigation.

Table 2
List of Method Compounds and Reporting Limits
Soil and Blank Sample Analysis
High School #5
South of Irvine Blvd and Desert Storm Dr
Irvine Unified School District
Irvine, California

Title 22 Metals			
Method	Compound	Soil Reporting Limit mg/kg	Water Reporting Limit mg/l
EPA 7471A	Mercury3	0.10	0.00020
EPA 6010B	Antimony3	1.0	0.0050
	Arsenic	1.0	0.010
	Barium3	1.0	0.0030
	Beryllium3	1.0	0.0030
	Cadmium3	1.0	0.0030
	Chromium	1.0	0.0030
	Cobalt	1.0	0.0030
	Copper3	1.0	0.0050
	Lead3	1.0	0.0050
	Nickel4	1.0	0.0050
	Molybdenum	1.0	0.0050
	Selenium	1.0	0.010
	Silver[3]	1.0	0.0030
	Thallium[4]	1.0	0.015
	Vanadium	1.0	0.0030
	Zinc	1.0	0.010
Organochlorine Pesticides			
Method	Compound	Soil Reporting Limit ug/kg	Water Reporting Limit ug/l
EPA 8081A	4,4'-DDD	2.0	0.050
	4,4'-DDE	2.0	0.050
	4,4'-DDT	2.0	0.050
	Aldrin	1.0	0.025
	alpha-BHC	1.0	0.025
	alpha-Chlordane	1.0	0.025
	beta-BHC	1.0	0.025
	Chlordane	8.5	0.25
	delta-BHC	1.0	0.025
	Dieldrin	2.0	0.050
	Endosulfan I	1.0	0.025
	Endosulfan II	2.0	0.050
	Endosulfan sulfate	2.0	0.050
	Endrin	2.0	0.050
	Endrin aldehyde	2.0	0.050
	Endrin ketone	2.0	0.050
	gamma-BHC	1.0	0.025
	gamma-Chlordane	1.0	0.025
	Heptachlor	1.0	0.025
	Heptachlor epoxide	1.0	0.025
	Methoxychlor	8.5	0.25
	Toxaphene	85	2.5
Total Petroleum Hydrocarbon Chains			
Method	Compound	Soil Reporting Limit mg/kg	Water Reporting Limit mg/l
EPA 8015M	C5-C12	1.0	0.02
	C10-C12	10	0.2
	C13-C15	10	0.2
	C16-C22	10	0.2
	C23-C32	10	0.2
	>C32	10	0.2
Polycyclic Aromatic Hydrocarbons			
Method	Compound	Soil Reporting Limit ug/kg	Water Reporting Limit ug/l
EPA 8270SIM	Acenaphthene	5.0	0.20
	Acenaphthylene	5.0	0.20
	Anthracene	5.0	0.20
	Benzo (a) Anthracene	5.0	0.20
	Benzo (a) Pyrene	5.0	0.20
	Benzo (b) Fluoranthene	5.0	0.20
	Benzo (g,h,i) Perylene	5.0	0.20
	Benzo (k) Fluoranthene	5.0	0.20
	Chrysene	5.0	0.20
	Dibenz(a,h) Anthracene	5.0	0.20
	Fluoranthene	5.0	0.20
	Fluorene	5.0	0.20
	Indeno (1,2,3-c,d) Pyrene	5.0	0.20
	Naphthalene	5.0	0.20
	Phenanthrene	5.0	0.20
	Pyrene	5.0	0.20
Polychlorinated Biphenyls			
Method	Compound	Soil Reporting Limit ug/kg	Water Reporting Limit ug/l
EPA 8082	Aroclor-1016	50	0.5
	Aroclor-1221	50	1.0
	Aroclor-1232	50	0.5
	Aroclor-1242	50	0.5
	Aroclor-1248	50	0.5
	Aroclor-1254	50	0.5
	Aroclor-1260	50	0.5
	Aroclor-1262	50	0.5
Dioxins and Furans			
Method	Compound	Soil Reporting Limit ng/kg	Water Reporting Limit
EPA 8290	2,3,7,8-TCDF	1.0	NA
	Total TCDF	1.0	NA
	2,3,7,8-TCDD	1.0	NA
	Total TCDD	1.0	NA
	1,2,3,7,8-PeCDF	5.0	NA
	2,3,4,7,8-PeCDF	5.0	NA
	Total PeCDF	5.0	NA
	1,2,3,7,8-PeCDD	5.0	NA
	Total PeCDD	5.0	NA
	1,2,3,4,7,8-HxCDF	5.0	NA
	1,2,3,6,7,8-HxCDF	5.0	NA
	2,3,4,6,7,8-HxCDF	5.0	NA
	1,2,3,7,8,9-HxCDF	5.0	NA
	Total HxCDF	5.0	NA
	1,2,3,4,7,8-HxCDD	5.0	NA
	1,2,3,6,7,8-HxCDD	5.0	NA
	1,2,3,7,8,9-HxCDD	5.0	NA
	Total HxCDD	5.0	NA
	1,2,3,4,6,7,8-HpCDF	5.0	NA
	1,2,3,4,7,8,9-HpCDF	5.0	NA
	Total HpCDF	5.0	NA
	1,2,3,4,6,7,8-HpCDD	5.0	NA
	Total HpCDD	5.0	NA
	OCDF	10.0	NA
	OCDD	10.0	NA

Table 3
Laboratory Quality Control Limits
High School # 5
South of Irvine Blvd and Desert Storm Dr
Irvine Unified School District
Irvine, California

Organochlorine Pesticides						
Method	Compound	RL ug/kg	MDL ug/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 8081A	4,4'-DDD	2.0	0.5			
	4,4'-DDE	2.0	0.5			
	4,4'-DDT	2.0	0.5	58-134	23-162	0-30
	Aldrin	1.0	0.5	75-129	68-127	0-30
	alpha-BHC	1.0	0.5			
	alpha-Chlordane	1.0	0.5			
	beta-BHC	1.0	0.5			
	Chlordane	8.5	5			
	delta-BHC	1.0	0.5			
	Dieldrin	2.0	0.5	75-124	66-129	0-30
	Endosulfan I	1.0	0.5			
	Endosulfan II	2.0	0.5			
	Endosulfan sulfate	2.0	0.5			
	Endrin	2.0	0.5	72-141	72-137	0-30
	Endrin aldehyde	2.0	0.5			
	Endrin ketone	2.0	0.5			
	gamma-BHC	1.0	0.5	78-130	67-130	0-30
	gamma-Chlordane	1.0	0.5			
	Heptachlor	1.0	0.5	65-139	61-134	0-30
	Heptachlor epoxide	1.0	0.5			
	Methoxychlor	8.5	0.5			
	Toxaphene	85	50			
Total Petroleum Hydrocarbon Chains						
Method	Compound	RL mg/kg	MDL mg/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 8015M	C5-C12	1.0	0.37	76-116	76-115	0-30
	C10-C12	10	0.37	76-116	76-115	0-30
	C13-C15	10	3.76	73-125	70-128	0-30
	C16-C22	10	3.76	73-125	70-128	0-30
	C23-C32	10	3.76	73-125	70-128	0-30
	>C32	10	3.76	73-125	70-128	0-30
Title 22 Metals						
Method	Compound	RL mg/kg	MDL mg/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 7471A	Mercury	0.10	0.0318	80-120	62-146	0-30
EPA 6010B	Antimony	1.0	1.23	80-120	23-118	0-20
	Arsenic	1.0	0.479	80-120	64-111	0-20
	Barium	1.0	0.775	80-120	36-146	0-20
	Beryllium	1.0	0.449	80-120	50-120	0-20
	Cadmium	1.0	0.525	80-120	62-107	0-20
	Chromium	1.0	0.487	80-120	63-119	0-20
	Cobalt	1.0	0.495	80-120	63-111	0-20
	Copper	1.0	1.54	80-120	58-136	0-20
	Lead	1.0	0.613	80-120	47-125	0-20
	Molybdenum	1.0	0.459	80-120	63-116	0-20
	Nickel	1.0	0.531	80-120	57-116	0-20
	Selenium	1.0	0.821	80-120	47-118	0-20
	Silver	1.0	0.452	80-120	48-125	0-20
	Thallium	1.0	0.921	80-120	49-116	0-20
	Vanadium	1.0	0.589	80-120	65-122	0-20
	Zinc	1.0	0.667	80-120	36-140	0-20
Polycyclic Aromatic Hydrocarbons						
Method	Compound	RL ug/kg	MDL ug/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 8270SIM	Acenaphthene	5	1.2	50-103	50-125	20
	Acenaphthylene	5	1.2			
	Anthracene	5	0.80			
	Benzo (a) Anthracene	5	0.99			
	Benzo (a) Pyrene	5	0.82			
	Benzo (b) Fluoranthene	5	1.30			
	Benzo (g,h,i) Perylene	5	4.10			
	Benzo (k) Fluoranthene	5	1.00			
	Chrysene	5	1.10			
	Dibenz(a,h)anthracene	5	3.10			
	Fluoranthene	5	1.00			
	Fluorene	5	1.10			
	Indeno (1,2,3-c,d) Pyrene	5	3.30			
	Naphthalene	5	1.40			
	Phenanthrene	5	1.10	58-109	45-149	20
	Pyrene	5	1.00	59-120	56-139	20
Polychlorinated Biphenyls						
Method	Compound	RL ug/kg	MDL ug/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 8082	Aroclor-1016	50	25.5			
	Aroclor-1221	50	28.4			
	Aroclor-1232	50	12.3			
	Aroclor-1242	50	5.1			
	Aroclor-1248	50	26.0			
	Aroclor-1254	50	12.6			
	Aroclor-1260	50	12.1	50-135	50-135	0-25
	Aroclor-1262	50	3.1			
Dioxins and Furans						
Method	Compound	RL ng/kg	MDL ng/kg	LCS % Rec.	MS/MSD % Rec.	MS/MSD RPD
EPA 8290	2,3,7,8-TCDF	1.0	0.89	40-135	70-130	20
	Total TCDF	1.0	0.89			
	2,3.7.8-TCDD	1.0	0.19	40-135	70-130	20
	Total TCDD	1.0	0.19			
	1,2,3,7,8-PeCDF	5.0	0.30	40-135	70-130	20
	2,3,4,7,8-PeCDF	5.0	2.50	40-135	70-130	20
	Total PeCDF	5.0	2.80			
	1,2,3,7,8-PeCDD	5.0	0.18	40-135	70-130	20
	Total PeCDD	5.0	0.18			
	1,2,3,4,7,8-HxCDF	5.0	0.45	40-135	70-130	20
	1,2,3,6,7,8-HxCDF	5.0	0.39	40-135	70-130	20
	2,3,4,6,7,8-HxCDF	5.0	0.35	40-135	70-130	20
	1,2,3,7,8,9-HxCDF	5.0	0.40	40-135	70-130	20
	Total HxCDF	5.0	1.59			
	1,2,3,4,7,8-HxCDD	5.0	2.50	40-135	70-130	20
	1,2,3,6,7,8-HxCDD	5.0	0.42	40-135	70-130	20
	1,2,3,7,8,9-HxCDD	5.0	0.38	40-135	70-130	20
	Total HxCDD	5.0	3.30			
	1,2,3,4,6,7,8-HpCDF	5.0	2.50	40-135	70-130	20
	1,2,3,4,7,8,9-HpCDF	5.0	2.50	40-135	70-130	20
	Total HpCDF	5.0	5.00			
	1,2,3,4,6,7,8-HpCDD	5.0	2.50	40-135	70-130	20
	Total HpCDD	5.0	2.50			
	OCDF	10.0	5.00			
	OCDD	10.0	5.00	40-135	70-130	20

Notes:
Blank cells denote analytes which are not part of the normally spiked compounds.

RL	Reporting Limit
MDL	Method Detection Limit
LCS	Laboratory Control Sample
MS/MSD	Matrix Spikes/Matrix Spike Duplicates
RPD	Relative Percent Difference