STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 94-63

AUTHORIZING THE EXECUTIVE DIRECTOR TO APPLY FOR AND ACCEPT A GRANT OF APPROXIMATELY $1,500,000 FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA), REGION 9, AND TO NEGOTIATE A WORKPLAN TO CONTINUE SOURCE INVESTIGATION ACTIVITIES IN THE SAN FERNANDO VALLEY

WHEREAS:

1. The San Fernando Valley ground water basin provides drinking water for over 600,000 people.

2. A portion of the San Fernando Valley and Verdugo ground water basins are polluted with volatile organic compounds and nitrates at concentrations exceeding State and federal drinking water standards.

3. Four areas within the San Fernando Valley were placed on USEPA's National Priority List (NPL) in 1986. The four areas are: North Hollywood/ Burbank, Crystal Springs, and Pollock well fields in the San Fernando Valley Basin, and the Crescenta Valley and Glorietta well fields in the Verdugo Basin.

4. The California Regional Water Quality Control Board, Los Angeles Region (Los Angeles RWQCB), has been investigating sources of ground water contamination in the San Fernando Valley under its Underground Tank and Well Investigation Programs since 1984 in an attempt to identify sources contributing to ground water pollution.

5. USEPA is making a grant available to the State Water Resources Control Board (SWRCB) which will continue funding for additional staff positions to continue source identification activities in the San Fernando Valley.

THEREFORE BE IT RESOLVD THAT:

The SWRCB authorizes the Executive Director or his designee to:

1. Apply for and accept a federal grant of approximately $1,500,000 from USEPA, and

2. Negotiate a workplan with USEPA for source identification activities in the San Fernando Valley.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on July 21, 1994.

Maureen Marché
Administrative Assistant to the Board

PROPOSED WORK PLAN

FOR THE

SAN FERNANDO VALLEY SOURCE

IDENTIFICATION COOPERATIVE AGREEMENT

JANUARY 1, 1995 - DECEMBER 31, 1995

LOS ANGELES COUNTY

CALIFORNIA

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

MAY 23, 1994

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SAN FERNANDO VALLEY SOURCE
IDENTIFICATION COOPERATIVE AGREEMENT

The goals of the San Fernando Valley Source Identification Cooperative Agreement are:

1. To accelerate the identification, assessment, and mitigation of sources of ground water pollution in the San Fernando Valley superfund sites.

2. To augment the California Regional Water Quality Control Board's (RWQCB) existing source investigation program.

3. To coordinate and encourage local entities' efforts to identify, assess, and mitigate sources of ground water contamination.

The U.S. Environmental Protection Agency (USEPA) has provided funding and will continue to provide funding to support the source identification and assessment portions of the RWQCB's existing well investigation program. This funding is meant to augment the existing program and free up State resources to conduct the site clean-up portions of the program.

This program is an ongoing project. A reevaluation of the resource needs and expected outputs will be conducted each year to reflect the information gained during the previous year.

TASK 1. POTENTIAL SOURCE IDENTIFICATION

OBJECTIVE: The objective of this task is to develop a list of potential sources of ground water contamination in each study area.

ACTIVITIES: The following is a description of the activities (subtasks) included in Task 1:

A. A drive-through survey will be conducted in each Investigation Area (IA) to generate a list of all facilities with the potential for on-site storage of chemicals.
B. A master list of potential sources will be finalized by reviewing: (1) State and federal right-to-know chemical information and (2) facility lists maintained by other agencies.
C. Where preliminary chemical use information is inadequate, facilities will be sent a request for chemical storage and use information (Appendix B).
D. As completed questionnaires are received, information will be logged into the computerized data tracking system, and a hard copy file will be created for each facility.
E. Follow-up for nonresponding facilities will be conducted using one or all of the following: telephone call, second letter, site visit, administrative enforcement letter, and/or formal enforcement action.

COSTS: Cost estimates are detailed in Table 1.

PRODUCTS: The number and location of IAs will be determined by USEPA Project Officer and RWQCB Program Manager. No new IAs are planned to be opened during the term of this contract.

REPORTING:

PROGRESS REPORTS: Will be submitted quarterly, thirty days after the last day of the previous quarter. Broken down by IA, the report for this task will contain a numeric summary and a detailed list of the following items:

1. Facilities contacted.
2. Questionnaires received.
3. Administrative and formal enforcement actions taken.

TASK 2. WALK THROUGH SITE INSPECTIONS

OBJECTIVE: The objective of this task is to conduct site inspections at each of the potential sources identified in Task 1 and to evaluate the likelihood and potential of discharge from each to soil and/or ground water.

ACTIVITIES: The following is a description of the activities included in Task 2:

A. Walk through site inspections will be conducted at all facilities. The inspections will be used to confirm the information submitted in the questionnaires and to observe the facilities chemical storage, use and disposal practices.
B. A walk-through site inspection check list will be completed and a narrative summary will be written describing the housekeeping practices observed at each facility.
C. The potential for present and/or past discharge from each facility will be evaluated. The evaluation will be based on the type and amount of chemicals used at the site, the method and condition of chemical storage facilities, the methods used for chemical conveyance, and the on-site waste storage, treatment and disposal practices.
D. Based on the evaluation described in Subtask 2C, if a facility has a potential for discharge it will be included in discharge confirmation work (Task 3).
E. Enforcement actions (CAO): if a serious problem is found during an inspection.

COSTS: Cost estimates are detailed in Table 1.

PRODUCTS: The projected number of facilities to be inspected during the period of this agreement is 273. This estimate was derived using data developed in 1993. The San Fernando Valley Source Identification Cooperative Agreement is currently budgeted at 2.0 PYs for this task. We have estimated thirteen hours per potential source for each inspection.

REPORTING:

PROGRESS REPORTS: Will be submitted quarterly, thirty days after the last day of the previous quarter. Broken down by IA, the

TASK 2. (Continued)

report for this Task will contain a numeric summary and a detailed list of the following items:

1. Facilities inspected.
2. Facilities recommended for inclusion in discharge confirmation (Task 3).
3. Facilities excluded from further work.
4. Facilities referred to other agencies.
5. Enforcement actions taken.

TASK 3. DISCHARGE CONFIRMATION

OBJECTIVE: The objective of this task is to confirm or deny discharge at the sites identified in Task 2.

ACTIVITIES: The following is a description of the activities included in Task 3:

A. Facilities identified in Subtask 2C will be requested to submit workplans for conducting initial soil and/or ground water investigations.
B. Staff will review the submitted workplans to ensure the work proposed will meet the minimum requirements needed to confirm or deny discharge (Appendix C).
C. Staff will oversee field activities as needed to ensure that the work performed follows the procedures described in the approved workplan.
D. Staff will collect soil and ground water samples for analysis as needed. All samples collected by staff will be sent to a USEPA contracted laboratory or to the State contracted laboratory.
E. Results from initial investigations will be reviewed to determine if a discharge has occurred. Facilities with confirmed ground water contamination will be required to conduct an assessment.
F. A written description of staff's interpretation of results will be prepared for each facility, i.e., further required work or close-out memorandum prepared.
G. Appropriate enforcement action will be taken for uncooperative facilities.
H. Local entities will be notified of confirmed discharges.

COSTS: Cost estimates are detailed in Table 1.

PRODUCTS: Experience gained from the existing source investigation program shows that approximately 20% of all facilities inspected are required to conduct investigations. This information, combined with the number of inspections estimated in Task 2, indicates that 60 new investigations will be initiated in this year of the agreement.

REPORTING:

PROGRESS REPORTS: Will be submitted quarterly, thirty days after the last day of the previous quarter. Broken down by IA, the report for this task will contain a numeric summary and a detailed list of the following items:

TASK 3. (Continued)

1. Facilities conducting initial soil investigations.
2. Facilities with confirmed soil contaminants.
3. Facilities conducting initial ground water investigations.
4. Facilities with confirmed ground water pollution.
5. Facilities required to conduct further assessment work.
6. Enforcement actions taken.

FACILITY REPORTS: One (1) copy of all facility reports will be submitted to USEPA and one (1) copy to the specified USEPA contractor.

FACILITY MAP: A map created using the GIS depicting the locations of the above facilities will be submitted.

WORKPLANS: One (1) copy of all workplans will be submitted to USEPA and one (1) copy to the specified USEPA contractor.

CORRESPONDENCE: One (1) copy of all Well Investigation facility-related correspondence will be sent to the USEPA.

TASK 4. PROGRAM MANAGEMENT

OBJECTIVE: The objective of this task is two-fold: (1) to provide coordination between the USEPA, State Water Resources Control Board (SWRCB), and RWQCB and (2) to administer the program.

ACTIVITIES: The following is a description of the activities included in Task 4:

A. Plan and oversee the overall program schedule and budget.
B. Program analysis and development.
C. Act as the lead to coordinate activities between the Division of Administrative Services (DAS), Office of Chief Counsel (OCC), DWQ, SWRCB management, RWQCB, and USEPA.
D. Recruit staff.
E. Coordinate data and graphic information exchanges between USEPA, SWRCB, and RWQCB.
F. Maintain computerized tracking system that will meet the reporting requirements of the USEPA and the RWQCB. This system tracks the progress of the facilities through both source identification, funded under this agreement, and site assessment, funded under the existing State Well Investigation Program.
G. Maintain investigations under GIS. Specific responsibilities for this activity will be described in GIS workplan that was jointly developed by USEPA and RWQCB.
H. Maintain all records regarding timekeeping, travel, and expenditures.
I. DAS will maintain all Superfund cost recovery documentation. Both original files and area files will contain time sheets, invoices, quarterly summaries of indirect and direct costs, dates, and amounts of drawdown. DAS will reconcile files with expenditures every six months and prepare financial status documents to facilitate the agreement.
J. OCC will provide legal assistance to SWRCB and RWQCB.
K. Prioritization of IAs to be coordinated between USEPA and RWQCB.
L. Involvement in meetings as part of Interagency Coordinating Committee and Subcommittee to discuss program implementation priorities and enforcement strategies.

COSTS: Cost estimates are detailed in Table 1.

PRODUCTS: The products of this task will be the successful initiation, management, and reporting of all tasks identified in this agreement.

TASK 4. (Continued)

REPORTING:

COST REPORTS: Will be submitted quarterly, thirty days after the last day of the previous quarter. The report for this task will contain the following items:

1. Expenditures to date (directly from DAS).
2. Expenditures during the previous quarter (directly from DAS).
3. Staff resources expended by IA and task.

PROGRESS REPORTS: Will be submitted quarterly, thirty days after the last day of the previous quarter.

1. Progress reported on State funded activities including site assessment and source elimination cleanup.

TASK 5. DATA ENTRY

OBJECTIVE: The objective of this task is to track all aspects of the program with an automated data management system and provide for the reporting needs of the RWQCB, SWRCB, and USEPA.

ACTIVITIES: The following is a description of the activities included in Task 5:

A. Data entry for all of the above tasks.
B. Data entry for soil groundwater sample reports.
C. Printing of standard reports.

COSTS: Cost estimates are detailed in Table 1.

PRODUCTS: The products of Task 5 will be the successful tracking of all tasks in this agreement and the production of the reports listed for Tasks 1-3.

REPORTING:

Ground water data will be dual-entry (entered twice) for quality control. No specific reports will detail the progress of this task, but all reports will be dependent on the accuracy and timeliness of this task.

TABLE I

STAFF ESTIMATE FOR SAN FERNANDO VALLEY SOURCE IDENTIFICATION COOPERATIVE AGREEMENT

JANUARY 1, 1995 - DECEMBER 31, 1995

TASK	STAFF LEVEL	STAFF
1. POTENTIAL SOURCE IDENTIFICATION	SENIOR WRCE	0.1
	ASSOC. ENG. GEOLOGIST	0.1
	POSITIONS	0.2
	PYs 0.2	
2. WALK THROUGH SITE INSPECTIONS	SENIOR WRCE	0.2
	ASSOC. WRCE	0.1
	WRCE	0.6
	SAN. ENG. ASSOC.	0.8
	ENV. SPEC. III	0.4
	POSITIONS	2.1
	PYs 2.0	
3. DISCHARGE CONFIRMATION	SENIOR WRCE	1.3
	ASSOC. ENG. GEOLOGIST	0.8
	ASSOC. WRCE	1.0
	WRCE	1.4
	SAN. ENG. ASSOC.	1.8
	ENV. SPEC. III	1.0
	POSITIONS	7.3
	PYs 7.0	
4. PROGRAM MANAGEMENT	EXEC. OFFICER	0.1
	PRINCIPAL ENG.	0.1
	SUPV. WRCE	0.8
	SENIOR WRCE	0.5
	SENIOR ENG. GEOLOGIST	0.3
	SAN. ENG. TECH.	0.5
	ASSOC. G.P. ANALYST	1.0
	ASSOC. ENG. GEOLOGIST	0.2
	STAFF COUNSEL II	0.1
	OFFICE SVCS. SUPV. I	0.5
	ACCOUNTANT I	0.4
	OFFICE ASSISTANT II	1.0
	OFFICE TECHNICIAN	1.0
	POSITIONS	6.5
	PYs 6.2	

TABLE I (Continued)

5. DATA ENTRY	KEY DATA OPERATORS		1.5
	OFFICE ASSISTANT		1.0
	POSITIONS		2.5
	PYs	2.4	
	TOTAL POSITIONS		18.6
	TOTAL PYs		17.8

TABLE II

SAN FERNANDO VALLEY GRANT PROPOSAL
ESTIMATED PERSONAL SERVICES COST

REGIONAL WATER BOARD STAFF	PYs	SALARIES
Executive Officer	0.1	$ 10,000
Principal Engineer	0.1	$ 9,000
Supervising WRC Engineer	0.8	$ 98,000
Senior WRC Engineer	2.0	$185,300
Assoc. WRC Engineer	1.0	$ 90,000
WRC Engineer	1.8	$170,000
Sanitary Eng. Associate	3.0	$193,700
Assoc. Eng. Geologist	1.2	$ 90,000
Environmental Specialist III	1.0	$ 90,000
Assoc. Gov't. Prog. Analyst	0.5	$ 64,000
San. Engineering Technician	0.7	$ 60,000
Office Services Supv. I	0.5	$ 30,000
Office Technician	1.0	$ 62,000
Key Data Operator	1.5	$ 70,000
Office Assistant	1.0	$ 30,000
	16.7	$1,252,000

STATE WATER BOARD STAFF	PYs	SALARIES
Senior Eng. Geologist	0.1	$ 10,000
Assoc. Gov't. Prog. Analyst	0.5	$ 29,000
Staff Counsel II	0.1	$ 10,000
Accountant I	0.4	$ 24,000
	1.1	$ 73,000
TOTAL PERSONAL SERVICES	17.8	$1,325,000
EQUIPMENT AND CONTRACTS		$ 160,000
TRAVEL		$ 15,000
TOTAL COST		$1,500,000

TABLE III

ESTIMATED EQUIPMENT AND SERVICES COST

Following are the descriptions and estimated costs of the equipment and services required to meet the objectives of this Cooperative Agreement. All equipment described below will be used solely for superfund related activities.

GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Software	$20,000
Training	$20,000
Maintenance	$60,000
	$100,000
Tektronix Phase III PXi Color Printer	$10,000
Soil Gas Contract	$50,000
Travel	$10,000
TOTAL	$175,000

ENTER FILE NO. FROM LETTER_____

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

CHEMICAL STORAGE AND USE QUESTIONNAIRE

I. COMPANY NAME:_____

II. FACILITY ADDRESS:_____

III. FACILITY INFORMATION

A. STANDARD INDUSTRIAL CLASSIFICATION CODE(SIC):_____

B. GENERATOR NUMBER(EPA/STATE):_____

C. BRIEF DESCRIPTION OF OPERATIONS:_____

_____

_____

_____

D. SEWER SYSTEM: INDUSTRIAL_____ MUNICIPAL_____

SEPTIC TANK_____ CESS POOL_____

WAS A DIFFERENT SEWER SYSTEM USED IN THE PAST? _____YES _____ NO

IF YES SPECIFY TYPE _____ DATE CONVERTED_____

E. FACILITY OWNER_____

F. HISTORY: DATE OPERATIONS BEGAN:_____

PRIOR OWNERS:_____

_____

IV. CHEMICAL STORAGE AND USE AT THE SITE. Complete sections A-G(page 2) for all chemicals in current use or that have been used in the past, use additional sheets if necessary.

JUL 1 2 1994

A. CHEMICAL NAME: ____________ B. COMMON/TRADE NAME: ____________

C. METHOD OF STORAGE: UNDERGROUND TANK___ ABOVE GROUND TANK___
BARRELS___ OTHER(specify) ____________

D. QUANTITY STORED: ____________

E. WASTE DISPOSAL METHOD: SEWERED___ HAULED___ ONSITE DISPOSAL___

F. IS THE WASTE TREATED PRIOR TO DISPOSAL: YES___ NO___
If yes, method of treatment: ____________

G. IS THE WASTE STORED PRIOR TO DISPOSAL: YES___ NO___

A. CHEMICAL NAME: ____________ B. COMMON/TRADE NAME: ____________

C. METHOD OF STORAGE: UNDERGROUND TANK___ ABOVE GROUND TANK___
BARRELS___ OTHER(specify) ____________

D. QUANTITY STORED: ____________

E. WASTE DISPOSAL METHOD: SEWERED___ HAULED___ ONSITE DISPOSAL___

F. IS THE WASTE TREATED PRIOR TO DISPOSAL: YES___ NO___
If yes, method of treatment: ____________

G. IS THE WASTE STORED PRIOR TO DISPOSAL: YES___ NO___

A. CHEMICAL NAME: ____________ B. COMMON/TRADE NAME: ____________

C. METHOD OF STORAGE: UNDERGROUND TANK___ ABOVE GROUND TANK___
BARRELS___ OTHER(specify) ____________

D. QUANTITY STORED: ____________

E. WASTE DISPOSAL METHOD: SEWERED___ HAULED___ ONSITE DISPOSAL___

F. IS THE WASTE TREATED PRIOR TO DISPOSAL: YES___ NO___
If yes, method of treatment: ____________

G. IS THE WASTE STORED PRIOR TO DISPOSAL: YES___ NO___

JUL 1 2 1994

V. THIS QUESTIONNAIRE SHALL BE SIGNED BELOW AS FOLLOWS:

A. In the case of corporations, by a principal executive officer at the level of vice-president or his duly authorized representative if such representative is responsible for the overall operation of the facility, or

B. In the case of a partnership, by a general partner, or

C. In the case of a sole proprietorship, by the proprietor, or

D. In the case of a municipal, State, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

This questionnaire has been completed under penalty of perjury and, to the best of my knowledge, is true and correct.

Signature:_____ Date:_____

Printed Name:_____

Title:_____ Phone:_____

Contact Name:_____

Title:_____ Phone:_____

QA/QC CHECK LIST FOR SOIL GAS SAMPLE ANALYSIS

Date:_____ By:_____

Name of soil gas company:_____

Name of site:_____

1. Keep a file of 3 point initial calibration including the most recent one for calculation of sample results.	Yes	No
a) Include all compounds listed on EPA 8010/8020.	Yes	No
b) %RSDs are all ≤ 20%.	Yes	No
2. Perform a 3 point initial calibration on site, if yes skip No.3.	Yes	No
a) Include all compounds listed on EPA 8010/8020.	Yes	No
b) %RSDs are all ≤ 20%.	Yes	No
3. Perform a daily one point calibration on site.	Yes	No
a) Include at least 6 halogenated and 3 aromatic compounds (must also include all the compounds detected at site).	Yes	No
b) RF of each compound is within ± 15% difference from the average RF of 3 point initial calibration.	Yes	No
4. Perform a method blank each day on site before analyzing any sample (Show no peak).	Yes	No
5. Perform a QC check sample each day before analyzing any sample.	Yes	No
a) Include at least 6 halogenated and 3 aromatic compounds.	Yes	No
b) Within ± 20% difference from true value OR RF of each compound is within ± 20% difference from the average RF of 3 point initial calibration.	Yes	No
6. Keep record of each sample analyzed.	Yes	No
7. Samples are analyzed within (30 mins) after sampling.	Yes	No

SWL : 2.594

STATE OF CALIFORNIA
California Regional Water Quality control Board
Los Angeles Region

REQUIREMENTS
For
GROUNDWATER INVESTIGATION
(WELL INVESTIGATION PROGRAM)

These requirements are to be used for hydrogeologic assessments and groundwater monitoring programs to determine:

1. Impacts of discharges on groundwater quality,
2. Lateral and vertical extent of contaminant plume(s),
3. Groundwater gradient and direction of flow, and
4. Specific aquifer properties as required.

WORKPLAN: A workplan must be submitted to meet the General Requirements For Subsurface Investigation and shall also include, but not be limited to, the following:

1. Provide a map, to scale, showing the location(s) of the proposed well(s) and nearby existing well(s).

2. Provide well design, specifications and construction details including casing and screen materials, screen length and placement with respect to water table, depth and type of annular seal.

3. Propose and explain drilling method(s) to be used and decontamination procedures.

4. Provide disposal plans for soil cuttings and development water.

FIELD PROCEDURE: The following investigation procedures must also be addressed in the workplan at a minimum.

MONITORING WELL CONSTRUCTION/DEVELOPMENT

1. Use a minimum of 4" diameter, stainless steel wire-wrapped screen.

2. Do not penetrate a competent clay layer below the saturated zone. Conduct physical and hydraulic tests to determine competency of any confining zone materials. Take a sample of the confining clay at the end of borehole for chemical analysis.

3. Suspend and centralize casing such that it is not resting against the sides nor bottom of the hole prior to fixing in place.

4. Place grout of either cement, bentonite or mixture in an appropriate manner to avoid bridging.

5. Characterize aquifer materials based upon sieve analysis for proper selection of filter pack and screen. Less than 10% of the filter pack should enter the well.

6. Provide geophysical logging for all well boreholes by qualified personnel to confirm the geologic logging per USCS during the drilling.

7. Establish benchmark relative to mean sea level. Provide benchmark location and survey date. Measure water levels to 0.01 foot. Provide well location using UTM Coordinates.

8. Wait no less than 48 hours for well seal materials to set before well development. Develop well such that the waters sampled are representative of the formation water. Obtain water sample with less than 5 NTUs of turbidity measurement to be acceptable for volatile organic compound (VOC) analysis.

WATER SAMPLING

1. Wait a minimum of seven days after well development.

2. Describe details of water sampling and provide:
   a) Water level measurement procedures;
   b) Purge techniques, purge volumes, and parameters (pH, temperature, conductivity, and turbidity) to assure the collection of a representative water sample;
   c) Water sampling device(s);
   d) Procedures to minimize loss of samples by adsorption and/or volatilization.

3. Describe methods for sample handling and preservation.

4. Comply with chain of custody procedures. Samples must be handled and analyzed per the Laboratory Requirements For Soil and Water Sample Analyses and QA/QC Guidance Document (11/92).

REPORTING:

1. Have final technical report signed by a California Registered Geologist or Engineer or Certified Engineering Geologist with five years hydrogeologic experience to be accepted.

2. Incorporate all boring logs, geophysical logs, and sieve analysis results with interpretation in final report.

3. Illustrate the groundwater contaminant plume(s) by plan view and cross section (to scale), including direction of section lines, scale, legend, constituent concentrations, and lithology.

4. Recommend additional assessment requirements and plans for site remediation as needed.

JUL 12 '94

STATE OF CALIFORNIA
California Regional Water Quality Control Board
Los Angeles Region

REQUIREMENTS
For
SUBSURFACE SOIL INVESTIGATION
(WELL INVESTIGATION PROGRAM)

These requirements are to be used when conducting initial and any supplementary engineering/geologic soils investigation to evaluate:

1. Waste discharges to soils at potential point sources areas,
2. Lateral and vertical extent of soil contaminants,
3. Soil properties which affect contaminant mobility and transport in the vadose zone.

WORKPLAN: A workplan must be submitted to meet the General Requirements For Subsurface Investigation and shall also include, but not be limited to, the following:

1. Indicate the number, location, and depth of soil borings and justify. Plot on facility map.

2. Take soil samples at 5-foot intervals, and each change in lithology or changes in observed contamination.

3. Explain proposed drilling method, equipment, and procedures for borings.

4. Describe equipment and procedures for collecting and handling of geologic materials.

5. Identify borehole backfill materials and disposal method for soil cuttings.

FIELD PROCEDURE: The following investigation procedures must also be addressed in the workplan at a minimum.

1. Extend boring depth if groundwater is encountered or if there is obvious contamination at the bottom of the borehole.

2. Do not use soil samples obtained by any air or fluid drilling methods for volatile, semi-volatile or petroleum hydrocarbon chemical analyses.

3. Provide complete and legible boring logs including:
   a) Description of earth materials, conditions (moisture, color, etc.), and classifications per Unified Soil Classification System (USCS);
   b) Lithographic column with USCS abbreviations and symbols;
   c) Sample depth in feet;

d) Penetration in blows per foot (blow counts) and inches (or percent) of sample recovered;

e) Vapor readings of samples using Organic Vapor Analyzer.

4. Use soil sample rings at least 2" (diameter) by 3" (length).

5. Take, seal, and transport discrete and undisturbed samples with no headspace to the laboratory for analysis. Do not use samples to be submitted for laboratory analyses for field screening or classification.

6. Comply with chain of custody procedures. Samples must be handled and analyzed per the Laboratory Requirements For Soil and Water Sample Analyses and QA/QC Guidance Document (11/92).

7. Sample and analyze water, if ground water is encountered, only after converting to a monitoring well or piezometer per the Requirements For Groundwater Investigation.

JUL 1 2 1994

STATE OF CALIFORNIA
California Regional Water Quality Control Board
Los Angeles Region

LABORATORY REQUIREMENTS
For
SOIL AND WATER SAMPLE ANALYSES
(WELL INVESTIGATION PROGRAM)

This document serves as a portion of the requirements for soils and groundwater investigation and site assessment and/or cleanup, and is complementary to the QA/QC Guidance Document (11/92), Requirements For Subsurface Soil Investigation and Requirements For Groundwater Investigation.

GENERAL:

1. Employ a laboratory certified by the State Department of Health Services, Environmental Laboratory Accreditation Program (ELAP) for each analytical testing method to be used.
2. Quantify method detection limits (MDLs) for low level testing. Report concentrations for constituents identified above MDLs. Otherwise, indicate as trace and provide estimated concentration.
3. Report an analytical result as "non-detected" (ND) only for constituents from samples analyzed without dilution.
4. Take appropriate corrective actions for any laboratory contamination or matrix interference problems and report the corrective actions in support of the analytical results. Do not have results blank adjusted.
5. Include laboratory QA/QC procedures and performance as follows:
   a) Calibration check standards including the most recent initial calibration range (the lowest to the highest injected concentrations) and average response factors (RF), %RSD, daily RF from continuing (mid-point) calibration and its percent difference from the initial calibration average RF;
   b) Method blanks (daily);
   c) Laboratory quality control check samples (LCS) and spiking concentrations (daily). LCS chemical standards and calibration standards must be obtained from different supply sources;
   d) Surrogate samples and spiking concentrations (each sample);
   e) Matrix spike and matrix spike duplicates (MS/MSD) (every batch of samples). If more than 10 samples are obtained for the subsurface investigation project, spike at least one of them.
6. Report all analytical results and QA/QC sample results on the LabForm 10A/10B (for volatile organics and petroleum hydrocarbons). Run all QA/QC items specified above on the same dates when samples were actually analyzed.

SOIL SAMPLES:

1. Analyze samples by EPA Methods 8010/8020 or 8260 for volatile organic compounds (VOCs) and EPA Method 418.1 and/or EPA Method 8015 (Modified) for total petroleum-based hydrocarbons (TPH). Use supplementary EPA Method(s) as necessary for any past and/or present site chemicals (e.g., metals, phenols, PCBs, etc.).

2. Achieve MDLs of 0.5 µg/kg for select VOCs and approach 5 mg/kg for EPA Method 418.1. Achieve MDLs of 50 - 500 µg/kg for EPA Method 8015 (Modified), depending upon type of hydrocarbons to be tested (gasoline, jet fuel, diesel, etc.).

3. Complete initial calibration consisting of a minimum of three points.

4. Analyze VOC samples within seven days and prior to other analyses (TPH, metals, etc.) unless separate samples are obtained at the site. Results for VOCs analyzed after seven days are considered to be low estimates of actual concentrations.

5. Specify and explain extraction method(s) and procedures to be used to prepare samples for hydrocarbon analyses based upon soil type and hydrocarbon characteristics. Fine-grained soils (clay or silt) or long-chain hydrocarbons require sufficient extraction time, which must be identified in the workplan and verified in the laboratory report.

WATER SAMPLES:

1. Analyze samples by EPA Methods 502.1/503.1 or 524.2 for VOCs. Use EPA Method 418.1 or EPA Method 8015 (Modified) for TPH analysis. Use supplementary EPA Method(s) as necessary for any past and/or present site chemicals. During the baseline groundwater monitoring, analyze general minerals and nitrogens (nitrate, nitrite, and ammonia).

2. Achieve MDLs of 0.1 µg/L for select VOCs and 2 mg/L for EPA Method 418.1. Achieve MDLs of 50 - 500 µg/L for EPA Method 8015 (Modified), depending upon type of hydrocarbons to be tested (gasoline, jet fuel, diesel, etc.).

3. Complete initial calibration consisting of a minimum of five points.

4. Analyze trip blanks, equipment blanks, and duplicate samples in addition to QA/QC items specified above.

5. Submit a separate sample for turbidity analysis and report result.

STATE OF CALIFORNIA
California Regional Water Quality Control Board
Los Angeles Region

GENERAL REQUIREMENTS
For
SUBSURFACE INVESTIGATIONS
(WELL INVESTIGATION PROGRAM)

Objectives of subsurface soil/groundwater investigations are to evaluate historic and current waste discharges and to mitigate them as potential sources of groundwater contamination. In addition to the general requirements provided herein, workplans must be submitted for each investigation to be conducted. Specific requirements for Subsurface Soil Investigation, Active Soil Gas Investigation, and Groundwater Investigation are provided separately. Site-specific modification to these requirements may be allowed upon consultation with the Regional Board staff. Work should not be initiated without pre-approval.

WORKPLAN: Submit three copies of the workplan with a minimum time schedule for submitting a final technical report.

SITE INFORMATION: Characterize past and present specific business activities. Describe storage, handling, use, and disposal procedures for chemicals and waste materials, primarily chlorinated solvents, aromatics and petroleum-based hydrocarbons. Give name, address, and phone number of any landlord/lessor. Complete the Site Audit Questionnaire. Submit the results of any previous subsurface investigations conducted at the site and any report(s) generated for site assessment.

FACILITY MAP: Draw a facility map to scale including a north arrow, property lines and adjacent street(s). Identify all past and present potential sources for soil and/or groundwater contamination, such as chemical and waste storage, transfer, and use areas including drum storage, tanks and piping, clarifiers, sumps, pits, septic tank/cesspool systems, and sewer lines. Indicate dates of completion of buildings or pavings where possible.

SITE HEALTH AND SAFETY PLAN: Submit a site-specific health and safety plan for subsurface investigation, commensurate with the scope and nature of work to be completed.

PERSONNEL: ASSURE THAT A CALIFORNIA REGISTERED GEOLOGIST OR ENGINEER OR CERTIFIED ENGINEERING GEOLOGIST BE ONSITE TO DIRECT OR CONDUCT SUBSURFACE INVESTIGATIONS FOR CERTAIN PERIODS OF TIME PROPORTIONAL TO THE SCOPE AND COMPLEXITY OF THE WORK AND SIGN THE FINAL TECHNICAL REPORT.

FIELD WORK: Do not proceed with field work without prior approval. Notify Regional Board staff at least 10 days prior to initiating

field work to permit observation of field activities and/or to take duplicate samples as needed.

REPORTS: Submit three copies of a final technical report within 4 weeks after completion of field activities. Include a description of all field drilling and sampling activities, summary of sample analytical results and related QA/QC data, conclusions based upon the analytical results and investigation findings, and recommendations for additional work as needed. Report all analytical results and QA/QC data on the LabForm 10A/10B (for volatile organics and petroleum hydrocarbons).

JUL 1 2 1994

STATE OF CALIFORNIA
California Regional Water Quality Control Board
Los Angeles Region

REQUIREMENTS FOR ACTIVE SOIL GAS INVESTIGATION
(March 1994)

Volatile organic compounds (VOCs) within the unsaturated zone partition into the adsorbed, dissolved, free liquid, and vapor phases. Measurement of VOCs through an active soil gas investigation allows: 1) evaluation of whether waste discharges of VOCs have occurred which may impact groundwater, 2) determination of spatial pattern and extent of vapor phase soil contamination, 3) establishment of vapor distribution for the design of soil vapor extraction system (SVE), and 4) determination of the efficiency of reduction in threat to groundwater from any cleanup action, including SVE. The work plan should include, but not be limited to, the following:

1.0 SURVEY DESIGN (LOCATION, NUMBER, DEPTH, DATA QUALITY OBJECTIVES)

1.1
Provide a scaled facility map depicting potential sources and proposed sampling points. Include locations and coordinates of identifiable geographic landmarks (e.g., street center-line, benchmark, street intersection, wells, north arrow, property line).

1.2
Locate initial sampling points in potential sources and areas with known soil contamination using an adjustable 10 to 20 foot grid pattern. Provide rationale for the number, location and depth of sampling points. Screen the remainder of the site with a 100-foot or less grid pattern.

1.3
Conduct a close interval (10 to 20 foot grid pattern) and multi-level sampling (5 to 10 feet vertically between points) in areas with known soil contamination and relatively high VOC concentrations.

1.4
Employ an on-site mobile laboratory with laboratory-grade certifiable instrumentation and procedures for real-time analysis of individual VOCs. Non-specific portable organic vapor analyzers and/or GC-based handheld detectors may not be used for analysis (during SVE they may be used for daily or weekly vapor monitoring).

1.5
Maintain flexibility in the sampling plan such that field modifications (grid pattern density, location and depth) can be made as real-time evaluation of analytical test results occurs. Include in the work plan decision-making criteria for these adjustments and explain decisions in the report. Field decisions shall be made in consultation with Regional Board staff.

.6
sample at any sampling point if anomalous data (i.e., 2 to 3 orders of magnitude difference from surrounding samples) are obtained. Additional points may be required to resolve the spatial distribution of the contaminants within the interval in question.

2.0 SAMPLE COLLECTION

2.1
Obtain samples at an adequate depth (nominally 5 feet) below ground surface (bgs) to minimize potential dilution by ambient air.

2.2
Conduct a site-specific purge volume versus contaminant concentration test at the start of the survey. Conduct this test based on soil type and where VOC levels are suspected to be highest. Adjust the purge rate and time to achieve the optimal purge volume. Discuss specific methods to determine optimal purge rates and volumes. In general, minimize purging to ensure that samples are representative of VOC concentrations at the probe tip. Note that the optimum purge volume may be compound specific. Therefore, it must be selected, in some cases, based on one target compound.

2.3
Explain expected zone of influence for sample points, taking into consideration soil types, land cover, drive point construction and sample purge rate/time/volume. The vertical zone of influence for purging and sampling must not intersect the ground surface.

Discuss soil gas sample collection, handling and testing procedures. Discuss procedures to prevent collection of samples under partial vacuum.

2.5
Discuss procedures to minimize equipment cross-contamination between sampling points.

2.6
Specify that the sampling equipment (e.g., gas tight syringe, sorbent trap) will not compromise the integrity of the samples. Tedlar bags may only be used for qualitative analysis.

2.7
Assure that the probe tip, probe and probe connectors have the same diameter to provide a good seal between the formation and the sampling assembly. If a space develops between the probe and the formation, as a result of probe advancement, seal (e.g., with bentonite) the area around the probe at the surface to minimize the potential for ambient air intrusion.

2.8
Some sampling systems utilize the probe as a conduit for Teflon tubing that connects to the probe tip. Assure that ambient air in the annular space between the probe and tubing is not in contact with the probe tip.

3.0 LABORATORY ANALYSIS OF SOIL GAS SAMPLES

TARGET COMPOUNDS

1. Carbon tetrachloride
2. Chloroethane
3. Chloroform
4. 1,1-Dichloroethane
5. 1,2-Dichloroethane
6. 1,1-Dichloroethene
7. cis-1,2-Dichloroethene
8. trans-1,2-Dichloroethene
9. Dichloromethane (methylene chloride)
10. Tetrachloroethene
11. 1,1,1,2-Tetrachloroethane
12. 1,1,2,2-Tetrachloroethane
13. 1,1,1-Trichloroethane
14. 1,1,2-Trichloroethane
15. Trichloroethene
16. Vinyl chloride
17. Benzene
18. Toluene
19. Ethylbenzene
20. Xylenes
21. Trichlorofluoromethane (Freon 11)
22. Dichlorodifluoromethane (Freon 12)
23. 1,1,2-Trichloro-trifluoroethane (Freon 113)

3.2 OTHER TARGET COMPOUNDS

Analysis of other VOCs (e.g., methyl ethyl ketone, methyl isobutyl ketone, ethylene dibromide, petroleum hydrocarbons, etc.) may be required based upon site history and conditions.

3.3 DETECTION LIMIT (DL)

Attain DL of not more than 1 μg/L for all target compounds. Higher DL is acceptable only for the compound(s) whose concentration exceeds the initial calibration range.

DETECTORS

The following detectors may be used in appropriate combinations:

Electrolytic conductivity detector (ELCD) (e.g., Hall)
Photoionization detector (PID)
Flame ionization detector (FID)
Mass spectrometer (MS)
Electron capture detector (ECD)

3.5.0 IDENTIFICATION OF CALIBRATION STANDARDS & LABORATORY CONTROL SAMPLE (LCS)

3.5.1
All calibration standards and LCS must be properly and clearly identified. The identification must agree with the data on record for the standards & LCS.

3.5.2
Prepare LCS from a second source standard that is totally independent from calibration standards used for the initial calibration. Second source means a different supplier (whenever possible) or a different lot from the same supplier.

3.6.0 GC CONDITIONS

3.6.1
Use a type of column that can separate all the target compounds. No coelution of the target compounds is acceptable unless the compounds can be distinguished and quantified by two different types of detectors in use at that time.

3.6.2
Analyze the initial calibration and daily mid-point calibration check standards, LCS, blank, and samples using the same GC conditions (i.e., detector, temperature program, etc.).

3.6.3
The GC run time must be long enough to identify and quantify all the target compounds.

3.7.0 INITIAL CALIBRATION

3.7.1
Perform an initial calibration:

1. for all 23 compounds listed in Section 3.1;
2. when the GC column type is changed;
3. when the GC operating conditions have changed;
4. when the daily mid-point calibration check cannot meet the requirement in Section 3.8.3; and
5. when specified by Regional Board staff based on the scope and nature of the investigation.

3.7.2
The initial calibration must consist of at least three different concentrations of the standard, with the lowest one not exceeding 5 times the DL for each compound.

3.7.3
Calculate the response factor (RF) for each compound and calibration concentration prior to analyzing any site samples. Calculate the average RF for each compound. The percent relative standard deviation (%RSD) for each target compound must not exceed 20% except for the following compounds which must not exceed 30%:

Trichlorofluoromethane (Freon 11)
Dichlorodifluoromethane (Freon 12)
Trichlorotrifluoromethane (Freon 113)
Chloroethane
Vinyl chloride

3.7.4
Verify the true concentration of the standard solutions used with the LCS after each initial calibration. Conduct the verification using a LCS with a mid-point concentration within the initial calibration range. The LCS must include all the target compounds and the RF must be within ±15% difference from the initial calibration.

3.8.0 DAILY MID-POINT CALIBRATION CHECK

3.8.1
Check the calibration using the calibration standard solution with a mid-point concentration within the linear range of the initial calibration before any sample is analyzed.

3.8.2
The daily mid-point check must include the following compounds and **every** compound expected or detected at the site:

1. 1,1-Dichloroethane
2. 1,2-Dichloroethane
3. 1,1-Dichloroethene
4. cis-1,2-Dichloroethene
5. trans-1,2-Dichloroethene
6. Tetrachloroethene
7. 1,1,1-Trichloroethane
8. 1,1,2-Trichloroethane
9. Trichloroethene
10. Benzene
11. Toluene
12. Xylenes

3.8.3
The RF of each compound (except for freons 11, 12 and 113, chloroethane, and vinyl chloride) must be within 85% to 115% of the average RF from the initial calibration. The RF for freons 11, 12 and 113, chloroethane, and vinyl chloride must be within 75% to 125%.

3.9.0 BLANK

3.9.1
Analyze field blank(s) to detect any possible interference from ambient air.

3.9.2
Investigate and determine the source(s) and resolve any laboratory contamination problem prior to analyzing any samples if the blank shows a measurable amount (≥ 1 μg/L) of the target compound(s).

3.10.0 SAMPLE ANALYSIS

3.10.1
The requirements for initial calibration, daily mid-point check, blank, and LCS must be met before any site samples are analyzed.

3.10.2
Analyze samples within 30 minutes after they are collected to minimize VOC loss. Longer holding time may be allowed if the laboratory uses a special sampling equipment (e.g., sorbent trap, glass bulb) and demonstrates that the holding time can exceed 30 minutes with no decrease in results.

3.10.3
The concentrations of constituent(s) in a sample must not exceed 50% above the highest concentration in the calibration range. Reanalyze the sample using a smaller volume or dilution if 50% above the highest concentration in the calibration range is exceeded.

3.10.4
Attain DL of not more than 1 µg/L for all target compounds. If lesser sample volumes or dilutions are used to off-set possible high concentration of constituents in the initial run, the initial run must be used to calculate the results for constituents that are not affected by the high concentration so that DL of 1 µg/L for these compounds can be achieved.

3.10.5
Quantify sample results using the average RF from the most recent initial calibration.

3.10.6
Add surrogate compounds to all samples if GC/MS is not used for analysis or compound confirmation.

3.11.0 COMPOUND CONFIRMATION

3.11.1
Conduct compound confirmation by GC/MS or surrogate compounds and second column.

3.11.2
If MS is used for analysis, identification must be done through mass spectrum and retention time comparison. Surrogate analysis and second column confirmation are not mandatory.

3.11.3
If surrogate compounds are used, they must be added to all calibration and daily mid-point check standards, blanks, site samples, and samples for second column confirmation to calculate the relative retention time (RRT) for monitoring the retention time shift between GC runs. This is recommended for further compound identification when ELCD, PID, ECD, and FID are used for analysis. Two to three different surrogate compounds should be used to cover the different temperature programming range for each GC run.

3.11.4
Surrogate compound concentration must be within the initial calibration range.

3.11.5
Use a surrogate in second column confirmation. Usually one sample is adequate and quantitation is not required. Second column confirmation can be done with a different GC. The representative sample can be collected in Tedlar bag and confirmation can be done off site.

3.11.6
Second column confirmation is not necessary if the compounds present have been identified from confirmed from previous soil gas investigations.

3.12.0 SAMPLES WITH HIGH CONCENTRATION

3.12.1
DL may be raised above 1 µg/L for compounds with high results (i.e., the limit as specified in Section 3.10.3) and those closely eluting compounds for which quantitation may be interfered by the high concentrations.

3.12.2
Quantify sample results according to Section 3.10.4 for analytes which are not affected by the high concentration compounds.

3.12.3
If high concentration in an area is known from previous soil gas analysis, Sections 3.12.1 and 3.12.2 are not necessary when analyzing samples from the area in question.

3.12.4
When dilution with ambient air is used for samples with high results, at least one sample must be diluted and analyzed in duplicate each day to verify the dilution procedure. Ambient air should be checked periodically during each day of analysis.

3.13.0 SHORTENED ANALYSIS TIME

3.13.1
Shorten the GC run time under the following conditions only:

1. The exact number and identification of compounds are known from previous soil and soil gas investigations; and
2. The consultant has been given permission by Regional Board staff to analyze only for specific compounds.

3.13.2
Meet the following requirements when shortening GC run-time:

1. The shortened run time must be approved by Regional Board staff;
2. The compounds must not coelute;
3. Initial calibration, daily mid-point calibration check, LCS, and samples must be analyzed under the same conditions as the shorter GC run-time;
4. Quantitations must be done using the average RF from the initial calibration utilizing the shorter run-time; and
5. A normal run-time must be performed whenever peaks are detected within retention time windows where coelution, as indicated by the calibration chromatograms, is likely.

3.14.0 LAST GC TEST RUN PER DAY OF ANALYSIS

3.14.1
Analyze a LCS as the last GC run of the day. Include the same compounds used in the daily mid-point calibration check analysis, as listed in Section 3.8.2. The RF for each compound must be within 80% to 120% of the average RF from the initial calibration. If the RF is not within these limits, all test results generated from the same day will be considered questionable and may be rejected by this Regional Board.

3.14.2
Analyze a LCS at the detection limit concentration instead of the mid-point concentration if all samples from same day of analysis show non-detect (ND) results. The recovery for each compound must be at least 50%. If it is less than 50%, all the ND results of the samples become questionable.

3.15.0 ON-SITE EVALUATION CHECK SAMPLE

3.15.1
Analyze on-site the evaluation check sample as part of the QA/QC procedures when presented with such a check sample by Regional Board staff. Provide preliminary results on-site.

3.15.2
If the results show that the soil gas consultant has problems with the analysis, all the results generated during the same day may be rejected. Correct all problems before any more samples are analyzed.

3.16.0 SITE INSPECTION

3.16.1
Unannounced, on-site inspection by Regional Board staff is routine. During the inspection, hard copies of the complete laboratory data, including raw data for initial calibration, daily mid-point check, LCS and blank results must be provided upon request. Failure to allow such inspection or to present these records or field data may result in rejection of all sample results.

3.16.2
The soil gas consultant must understand the instruments, analytical and QA/QC procedures and must be capable of responding to reasonable inquiries.

3.17.0 RECORDKEEPING IN THE MOBILE LABORATORY

Maintain the following records in the mobile laboratory:

1. A hard copy record of calibration standards and LCS with the following information:

   a) Date of receipt
   b) Name of supplier
   c) Lot number
   d) Date of preparation for intermediate standards (dilution from the stock or concentrated solution from supplier)
   e) ID number or other identification data
   f) Name of person who performed the dilution
   g) Volume of concentrated solution taken for dilution
   h) Final volume after dilution
   i) Calculated concentration after dilution

2. A hard copy of each initial calibration for each instrument used for the past few months.

3. The laboratory standard operating procedures.

4.0 REPORTING OF SOIL GAS SAMPLE RESULTS AND QA/QC DATA

4.1
Report all sample test results and QA/QC data. Include in the table of sample results all compounds in the analyte list. Report unidentified or tentatively identified peaks. All raw data including the chromatograms must be submitted upon request.

4.2
Report the following for all calibration standards, LCS and environmental samples:

1. Site name
2. Laboratory name
3. Date of analysis
4. Name of analyst
5. Instrument identification
6. Normal injection volume
7. Injection time
8. Any special analytical conditions/remark

4.3
Provide additional information, as specified, for different types of analyses. Tabulate and present in a clear legible format all information according to the following grouping:

1. Initial calibration

   a) Source of standard (**STD LOT ID NO.**)
   b) Detector for quantitation (**DETECTOR**)
   c) Retention time (**RT**)
   d) Standard mass or concentration (**MASS/CONC**)
   e) Peak area (**AREA**)
   f) Response factor (**RF**)
   g) Average response factor ($\mathbf{RF_{ave}}$)
   h) Standard deviation ($\mathbf{SD_{n-1}}$) of RF, i.e.,

   $$\left[\sum_{i=1}^{n} (RF_{ave} - RF_i)^2 / (n - 1)\right]^{1/2}$$

   n = number of points in initial calibration

   i) Percent relative standard deviation (**%RSD**), i.e., $(SD_{n-1} / RF_{ave}) \cdot 100$ (%)
   j) Acceptable range of %RSD (**ACC RGE**)

2. Daily calibration check sample

   a) Source of standard
   b) Detector
   c) Retention time (RT)
   d) Standard mass or concentration
   e) Peak area
   f) Response factor (RF)
   g) Percent difference between RF and RF_{ave} from initial calibration (**%DIFF**)
   h) Acceptable range of %DIFF (**ACC RGE**)

3. LCS. Same format as daily calibration

4. Environmental sample

   a) Sample identification
   b) Sampling depth
   c) Purge volume
   d) Vacuum pressure
   e) Sampling time
   f) Injection time
   g) Injection volume
   h) Dilution factor (or concentration factor if trap is used)
   i) Detector for quantitation
   j) Retention time (RT)
   k) Peak area
   l) Concentration in μg/L (**CONC**)
   m) Total number of peaks found by each detector
   n) Unidentified peaks and/or other analytical remarks

Surrogate and second column confirmation

Mark RT and compound name on: a) second column chromatogram of standard and b) second column chromatogram of confirmation sample.

4.4
Use the QA/QC and results reporting formats in Appendix A. Compounds may be listed by retention time or in alphabetical order.

4.5
Discuss the method(s) to be used for data interpolation (contouring). Isoconcentration maps for each VOC detected, total chlorinated volatile organics, total aromatic hydrocarbons and petroleum-based hydrocarbons must be provided for each sampling depth, as appropriate, and included in the final report. Provide cross-section(s) depicting the geology and changes in contaminant concentration with depth, as justified by the data.

5.0 COMPANION SOIL SAMPLING

5.1
Discuss soil boring locations with Regional Board staff.

5.2
Boring locations and sampling depths will be based upon all available information including soil gas survey test results.

5.3
Conduct the soil sampling and analysis per this Regional Board's **Well Investigation Program General Requirements for Subsurface Investigations, Requirements for Subsurface Soil Investigation** and **Laboratory Requirements for Soil and Water Sample Analyses.**

6.0 VERTICAL PROFILING/NESTED VAPOR PROBES

Install nested vapor probes for vertical profiling in areas where significant VOCs were identified during the initial investigation. The objectives of vertical profiling are to: 1) assess the vertical distribution of VOCs in the vapor phase within the unsaturated zone, 2) determine the spatial pattern of vapor phase soil contamination at different depths within the unsaturated zone, 3) identify migration pathways at depth along which VOCs may have migrated from sources, and 4) serve as discrete monitoring points to evaluate the efficiency of a cleanup action.

Address appropriate items in the following sections when vertical profiling is conducted.

6.1
Collect undisturbed soil samples if fine-grained soils are encountered during drilling of the boring for the probes. Due to air-stripping effect, VOC analysis of soil samples is not required if air drilling method is used. Refer to Section 5.3 for sampling and testing requirements.

6.2
Use all available information (e.g., geologic log) to select appropriate depths for vapor monitoring. Probes should be installed slightly above fine-grained soils which can retard the migration of VOCs. The deepest probe should be installed above the capillary fringe.

6.3
Consider installing nested probes in the annular space of groundwater monitoring wells, especially in areas with coarse-grained soils where collection of soil samples is difficult and sites where VOC remediation may be required.

6.4
Use small-diameter (e.g., ≤1/4 inch) continuous tubing attached from the probe to the ground surface to minimize purge volume. If a plastic/flexible tubing is used, consider attaching a weight at the probe tip to ensure that the tip remains in-place during installation.

6.5
Extend the sand pack around the vapor probe a sufficient distance above the probe to allow for settling of back-fill materials. Place bentonite seals between the sand packs to isolate the sampling zones. In general, the sand pack should not exceed 2 feet in thickness. In deep borings, the sand pack should extend about four feet above the probe to allow for settling of back-fill materials and to reduce the potential for the bentonite seal settling around the probe.

6.6
Provide a schematic diagram of the nested probe design and a cross-section of the site showing the major lithologic units and zones for vapor monitoring.

Specify the schedule for sampling each probe. In general, soil gas monitoring is required one month and two months after installation. Regional Board staff may require a different sampling schedule and additional sampling based upon site conditions and test results.

7.0 PARTIAL LIST OF SOIL GAS CONSULTANTS

A partial list of soil gas consultants is available for the convenience of the public who require assistance to select soil gas consultants for conducting soil gas investigations.

Regional Board staff requested soil gas consultants to submit a laboratory data package demonstrating their analytical capabilities. We have found the analytical testing methods of the soil gas consultants on the list to be acceptable. Although other soil gas consultants not on the list may be used, mobile laboratory capabilities must be demonstrated **prior** to performing any work. Sample collection and handling procedures employed must not compromise the integrity of the samples.

Retaining a soil gas consultant from the list does not assure acceptance of that consultant's work. This Regional Board reserves the authority to review any soil gas consultant's work to assure compliance with all applicable statutes, regulations, orders, and guidelines. It is your responsibility to ascertain that the individual directing the field investigation is professionally qualified and conducts the field work in an acceptable manner.

ACKNOWLEDGEMENTS

This guideline was produced by David Bacharowski, Alex Carlos, Phil Chandler, Yue Rong, Roy Sakaida, Hiam Tan, and Samuel Yu of the California Regional Water Quality Control Board-Los Angeles Region (CRWQCB-LA), Well Investigation Program. Special thanks go to the staff of the CRWQCB-LA for reviewing the information contained in the document. In addition, discussions and written comments received from soil gas consultants have greatly improved the content of this guideline.

APPENDIX A

ALTERNATIVE FORMAT FOR REPORTING SOIL GAS SAMPLE RESULTS

SITE NAME: _____ LAB NAME: _____ DATE: _____

Sample ID Sampling Depth	Sample 1	Sample 2	Sample 3 ...
COMPOUND	CONC	CONC	CONC
Compound 1			
Compound 2			
Compound 3			
.			
.			
.			
.			
.			
.			

(Page 1 of 2, Results Summary)

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ COLLECTOR: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____

Sample ID		Sample 1		Sample 2		Sample 3 ...	
Sampling Depth							
Purge Volume							
Vacuum							
Sampling Time							
Injection Time							
Injection Volume							
Dilution Factor							
COMPOUND	DETECTOR	RT	AREA	RT	AREA	RT	AREA
Compound 1							
Compound 2							
Compound 3							
.							
.							
.							
Surrogate 1							
Surrogate 2							
.							
.							
Total Number of Peaks							
by Detector 1 (specify)							
by Detector 2 (specify)							

Unidentified peaks and/or other analytical remarks

(Page 2 of 2, Analytical Raw Data)

SOIL GAS SAMPLE RESULTS

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ COLLECTOR: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____

Sample ID	Sample 1	Sample 2	Sample 3 .....
Sampling Depth			
Purge Volume			
Vacuum			
Sampling Time			
Injection Time			
Injection Volume			
Dilution Factor			

COMPOUND	DETECTOR	RT	AREA CONC	RT	AREA CONC	RT	AREA CONC
Compound 1							
Compound 2							
Compound 3							
.							
.							
.							
.							
.							
Surrogate 1							
Surrogate 2							

Total Number of Peaks
by Detector 1 (specify)
by Detector 2 (specify)

Unidentified peaks and/or other analytical remarks

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SOIL GAS IN[illegible]AL CALIBRATION

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ STD LOT ID NO.: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____ INJECTION TIME: _____

COMPOUND	DETECTOR	1st CONC RT/RRT	1st CONC MASS/CONC	1st CONC AREA	1st CONC RF	2nd CONC RT/RRT	2nd CONC MASS/CONC	2nd CONC AREA	2nd CONC RF	3rd CONC RT/RRT	3rd CONC MASS/CONC	3rd CONC AREA	3rd CONC RF	RF_{ave}	SD_{n-1}	%RSD	ACC RGE

OR

COMPOUND	DETECTOR	RT/RRT	MASS/CONC	AREA	RF	RF_{ave}	SD_{n-1}	%RSD	ACC RGE
Compound 1		_____	1st conc	_____	_____				
		_____	2nd conc	_____	_____				
		_____	3rd conc	_____	_____				
Compound 2 (Surrogate)									

SOIL GAS DAILY MID-POINT CALIBRATION STANDARD

AND

SOIL GAS LABORATORY CONTROL SAMPLES (LCS)

SITE NAME: _____ LAB NAME: _____ DATE: _____

ANALYST: _____ STD LOT ID NO.: _____ INSTRUMENT ID: _____

NORMAL INJECTION VOLUME: _____ INJECTION TIME: _____

COMPOUND (SURROGATE)	DETECTOR	RT/RRT	MASS/CONC	AREA	RF	%DIFF	ACC RGE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

QUALITY ASSURANCE/QUALITY CONTROL GUIDANCE DOCUMENT FOR WELL INVESTIGATION PROGRAM - SAN GABRIEL AND SAN FERNANDO BASINS

EPA ARCSWEST CONTRACT NO. 68-W9-0031
WORK ASSIGNMENT NO. 31-24-9927
CH2M HILL PROJECT NO. 69129.06

November 1992

CONTENTS

INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Guidance Document (Document) presents U.S. Environmental Protection Agency's (EPA) minimum requirements for documenting specimen (sample) collection and analysis. The Document is to be followed by site owners and/or operators and their designated consultants performing subsurface engineering or geologic site investigations under the direction of the Los Angeles Regional Water Quality Control Board (LARWQCB) Well Investigation Program in EPA Superfund areas.

This Document discusses the QA/QC guidelines for the following aspects of the site investigation:

- Sample Documentation
- Sample Handling
- Sampling Procedures
- QA/QC Requirements (Field and Laboratory)

The sample documentation requirements identify the minimum documentation required to track samples from the field through the laboratory and to track the analytical results back to the data user. This Document will help the owner/operator relate data generated in the laboratory back to the sampling location. The requirements specified in this document are summarized in a checklist provided in Appendix A.

In addition to following the requirements specified in this Document, it is the owner/operator's responsibility to conduct the site investigation in accordance with acceptable practice and to conform to all pertinent federal, state, and local regulations. All work plans shall be approved by the LARWQCB before the start of field sampling.

SAMPLE DOCUMENTATION

This section describes requirements for sample and document control procedures.

SAMPLE CONTROL

SAMPLE IDENTIFICATION

When performing a site investigation, a sample identification system shall be developed and documented in the Sampling Plan.[1,2,3] The identification system shall include information related to the type of sample, a number unique to that sample or location, and a sampling round identifier. The following is an example of a sample identification system.

For the identifier 91SW2101, the first two numbers represent the year in which the sample was collected. The following two letters are used to identify the type of sample:

SW = Surface Water
RW = Residential Well
GW = Groundwater
SS = Surface Soil
SB = Soil Boring
AA = Ambient Air
SV = Soil Gas (only applicable to samples analyzed by an offsite laboratory)
CS = Clarifier/Sump Sludge
PW = Public Production Well

A unique sample number is then used to identify the sample location or well number. Finally, a two-digit number identifies the sampling round in case the same location is sampled more than once. A figure showing proposed sample locations shall be prepared and included in the Sampling Plan and Work Plan before field work begins. A cross-reference list equating sample numbers with specific sample information (e.g., location, date sampled, sample media, blank, duplicate, etc.) shall be maintained.

Field QC samples shall also be assigned a unique sample number to prevent the laboratory from identifying those samples. To prevent the field blank samples from being used for laboratory QC analyses (i.e., matrix spikes), a sample shall be designated for laboratory QA and use, and a notation that a sample is to be used for laboratory QC shall be made on the sample tag and the chain-of-custody record.

SAMPLE TAGS/LABELS

Samples to be shipped to the laboratory shall have either a sample tag or label attached to each container.[2] An example sample tag is shown in Figure 1. If a label is used, it shall contain the same information. At a minimum, the sample tag/label shall include space to identify analyses to be performed, the sample identifier, date of collection, time of collection (military time), sampler's signature, type of sample (grab or composite), and whether any preservatives were added. All information included on the sample tag/label shall be cross-referenced in the field logbook, including the sample tag number. Sample tags/labels shall be filled in using waterproof ink. If waterproof ink cannot be used, a logbook notation shall be made to explain why.[1] Copies of all field logbook entries must be included in final reports.

CHAIN-OF-CUSTODY

All samples shall be collected under chain-of-custody procedures to maintain and document sample possession.[4] A sample is in a person's custody if it either is in the person's possession, in the person's view after being in the person's possession, or was in the person's possession and that person locked it up or placed it in a designated secure area.[1]

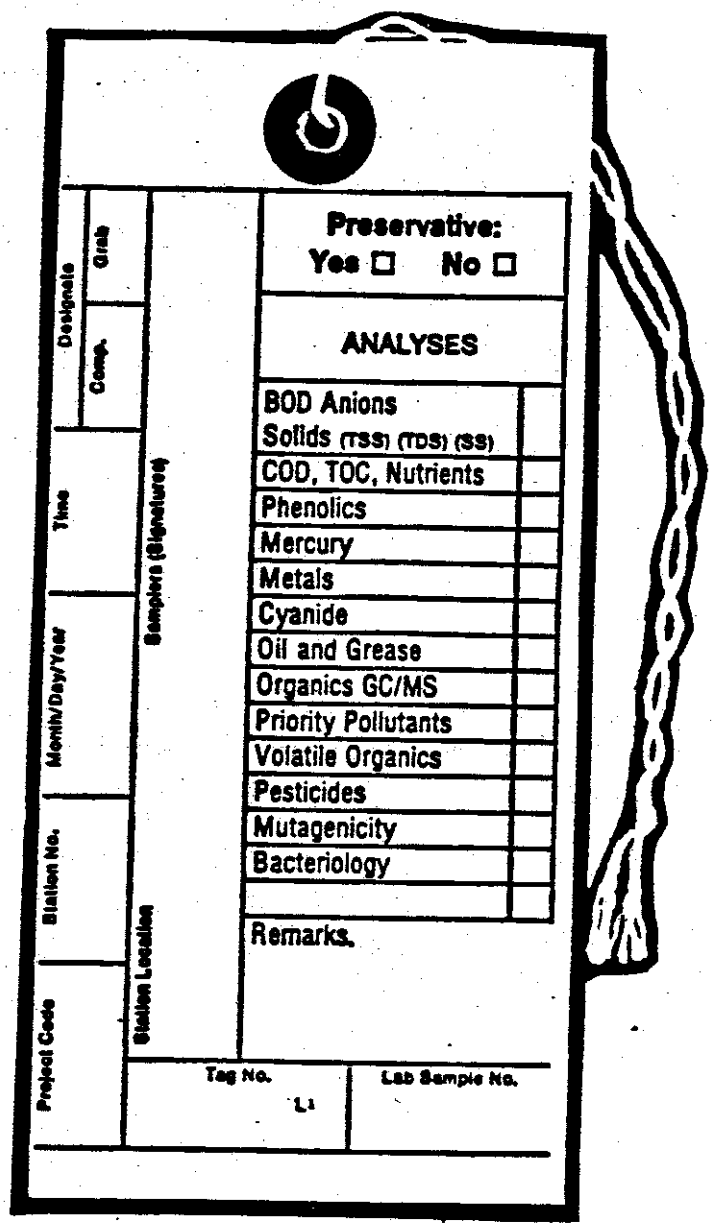
Groundwater sample custody starts with the cleaning of the sample containers. Once they are cleaned and packaged, custody seals shall be placed on the packages to document that they have not been tampered with during shipment. The seals shall only be broken when it is time to use the containers. Any unused containers shall remain in custody or in a secured area until they are used. When opening a new package of containers, the condition of the custody seal shall be recorded in the field logbook. Stainless steel or brass soil sample sleeves used to collect undisturbed soil samples do not need to follow the same chain-of-custody procedures; however, the sleeves must be decontaminated (decontamination procedures are described below) prior to use.

Field Custody Procedures

The field sampler is responsible for the care and custody of the samples until they are shipped or otherwise delivered to the laboratory custodian. The field sampler in charge shall complete a sample tag/label for each container. All sample tag/label information shall be inscribed using waterproof ink unless prohibited by weather conditions. If waterproof ink cannot be used, a logbook notation shall be made to explain why.[1]

Custody Seals

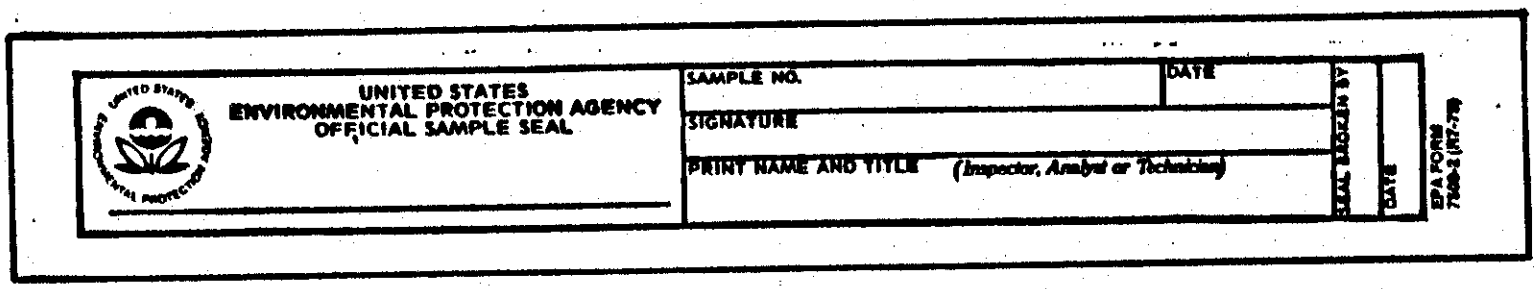
Custody seals shall be used whenever samples are not in someone's possession. An example custody seal is shown in Figure 2. Custody seals may be placed directly on the sample container, a shipping cooler, or the door to a storage facility. Custody seals shall be placed so that it is not possible to tamper with samples without breaking the



Sample Tag

FIGURE 1

QA/QC GUIDANCE DOCUMENT



CUSTODY SEAL

FIGURE 2

QA/QC GUIDANCE DOCUMENT

seal.[2] Custody seals may be placed on individual sample bottles; however, care must be taken not to cover the Teflon septum on volatile organic analysis vials. Placing custody seals on individual bottles will maintain sample custody if the seals on the shipping container are accidentally broken.

Transfer of Custody

A chain-of-custody record shall be completed before shipping.[1] An example chain-of-custody record is shown in Figure 3. When transferring the possession of samples, the persons relinquishing and receiving the samples shall sign, date, and note the time on the record. This record documents sample custody from the sampler to the person responsible for sample packaging, and finally through the laboratory. Any person who assumes custody of the samples, including mail clerks, must sign the chain-of-custody record. Overnight carriers typically refuse to sign custody records; thus, when samples are relinquished to an overnight carrier, shipping containers must be sealed with custody seals by the person relinquishing custody. The carrier may then transport the samples to the destination. Upon receipt, the person who opens the shipping container shall sign the chain-of-custody record, accepting custody of the samples. This is sufficient to maintain custody as long as the seals are not broken during shipment. If a custody seal is broken during shipment, the LARWQCB shall immediately be notified.

All sample shipment containers shall be accompanied by a chain-of-custody record that corresponds to the samples contained within. The original record shall accompany the shipment, and a copy is retained by the sampling coordinator.

Laboratory Custody

A designated sample custodian shall accept custody of the shipped samples and verify that the information on the sample tags/labels matches the information on the chain-of-custody records. Important information regarding the shipment shall be documented, including whether the custody seals are intact, sample bottles are broken, or samples were not chilled properly (the analytical laboratory shall report the temperature of the container when received). Sample tag data shall then be entered into a bound logbook documenting sample receipt.

The sample custodian shall use the sample identifier (i.e., tag number) or assign a unique laboratory number to each tag to track the sample through the laboratory. The sample custodian shall then maintain custody in a secure area until sample analysis.

The custodian shall distribute samples to the appropriate analysts who are responsible for the care and custody of the samples until they are exhausted or returned to the sample custodian.

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION
75 Hawthorne Street
San Francisco, California 94105

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CON-TAINERS								REMARKS
SAMPLERS: *(Signature)*										
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION					

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

9 12480

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FIGURE 3
QA/QC GUIDANCE DOCUMENT

When all sample analyses and QA/QC checks have been completed, the unused portion of each sample shall be properly discarded. All identifying tags/labels, data sheets, and laboratory records shall be retained as part of the permanent documentation. The facility owner/operator shall review the data package for completeness before allowing the laboratory to dispose of any remaining sample volumes or containers. Prior to destruction of any records, either originals or copies of the records shall be offered to the LARWQCB.

RECEIPT FOR SAMPLES

Should a representative of a governmental agency obtain a sample from the owner/operator's premises, the representative is required to provide the owner/operator with a receipt for the sample.[1] An example receipt-for-samples form is shown in Figure 4. A copy of the receipt-for-samples form shall be provided even if the offer for splits is declined by the owner/operator. The original is to be retained by the governmental representative.

DOCUMENT CONTROL

Document control is necessary to account for all project documents when the project has been completed. Accountable documents include logbooks, field data records, correspondence, sample tags, graphs, chain-of-custody records, field and laboratory bench sheets, photographs, and any other project-specific information. Certified copies of project documents shall be sent to the LARWQCB upon completion of the project.

FIELD LOGBOOKS

When field measurements are taken, results shall be recorded directly into a bound field logbook or on field data sheets. The entries shall include the sample identifier, date and time (military) of the measurement, samplers' names, and any observations made at the time of the measurement. Types of field measurements include pH, conductivity, water level, soil type, physical appearance of the soil, soil boring log, etc.

Field logbooks shall be used to record all pertinent information until the project is completed. The individuals making entries shall sign the logbooks after each entry. All logbook entries are to be made using waterproof ink unless prohibited by weather. All logbook entries shall be dated. Entries shall be objective and factual since they may later be used for report preparation and are considered legal documents.[1] Logbooks shall be bound with prenumbered pages.

RECEIPT FOR SAMPLES

PROJ. NO.	PROJECT NAME	Name of Facility
SAMPLERS: (Signature)		Facility Location
Split Samples Offered ( ) Accepted ( ) Declined		

STA NO	DATE	TIME	GRAB	COMP	SPLIT SAMPLES	TAG NUMBERS	STATION DESCRIPTION	NO OF CONTAINERS	REMARKS

Transferred by: (Signature)	Received by: (Signature) Telephone
Date Time	Title Date Time

Distribution: Original to Coordinator Field Files; Copy to Facility

N 842

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FIGURE 4

QA/QC GUIDANCE DOCUMENT

CORRECTIONS TO DOCUMENTATION

As previously stated, unless prohibited by weather conditions, all original data shall be written in waterproof ink. If waterproof ink cannot be used, a logbook notation shall be made to explain why.[1] Corrections shall be made by drawing a single line through the incorrect entry and then adding the correct entry. The person recording the initial entry shall, if possible, make all corrections. All corrections shall be initialed and dated by the person recording them.

SAMPLE HANDLING

This section describes sample container requirements and shipping requirements. Required sample containers for specific analyses are listed in 40 CFR Part 136.3 or in the approved analytical method.

SAMPLE CONTAINERS

Sample containers are most often obtained from the laboratory performing the analyses. The laboratory must have documented standardized bottle washing procedures and be capable of demonstrating the cleanliness of the containers through its QA program. Sample containers may also be purchased through an outside source if that source has a QA program in place to demonstrate that the containers are clean. Sample containers must be cleaned specifically for the analysis to be performed.

Once the sample containers are cleaned, the containers shall be packaged and the packages sealed with custody seals. The packages shall not be opened until it is time to use the containers. Sample containers shall be stored in an area that is free from dust.

SAMPLE SHIPPING

The short holding times associated with many sample analyses may make it necessary to ship samples by either overnight or common carrier. Samples preserved with nitric acid may not be shipped on passenger aircraft or railroads.[1] All federal, state, and local regulations must be carefully observed when shipping any type of sample. The bibliography includes references for the regulations that most often apply.

The following guidelines allow for the proper shipping of most samples using an overnight air service. A detailed description of proper shipping techniques is presented in the User's Guide to the Contract Laboratory Program and NEIC Policy and Procedures.[2,1]

After all the necessary paperwork is completed, the sample containers are sealed in plastic bags with the sample number on the tag/label visible. This way, if the sample container is broken, the sample will not leak out into the shipping container. If the sample is known to contain more than 10 parts per million of a single contaminant, it shall be placed in a metal paint can and packed with a noncombustible, absorbent packing material such as vermiculite.[5] All applicable shipping labels are placed on the paint can and on the shipping container. Next, the paint can or sample container is placed in a shipping container and, if necessary, ice packs or ice sealed in plastic bags is placed around the container to cool the sample to 4°C. A picnic cooler works well; however, other shipping containers may be used. To prevent breakage, vermiculite or

an alternative material shall be placed around the samples so they do not touch each other or the sides of the shipping container. The chain-of-custody records and other paperwork that must accompany the shipment shall be sealed in a plastic bag and taped to the lid of the shipping container. The cooler is then closed and wrapped with strapping tape. Custody seals are placed on the cooler in opposite corners so they will be broken if the container is opened during shipment. Finally, the container is ready for shipping when all necessary shipping labels and address labels are applied.

SAMPLE HOLDING TIMES AND PRESERVATIVES

The following shall be included in the Work Plan: sample holding times, preservative requirements, container size, number of containers per sample, and minimum analytical volumes.

SAMPLING PROCEDURES

All activities associated with the subsurface engineering/geologic site investigation are to be directed by qualified California registered or certified personnel. These activities include drilling and logging of soil test borings; and drilling, logging, well design/installation, geophysical logging, and development of monitoring wells.

The following sampling and decontamination procedures provide minimum requirements that shall be followed when performing a site investigation for the LARWQCB Well Investigation Program.

DECONTAMINATION

Before initial sampling, the sampling and drilling equipment shall be washed with a nonphosphate detergent and rinsed with tap water, deionized water, a reagent-grade solvent rinse appropriate for the chemical analysis to be conducted, and then rinsed again with deionized water at least three times. All rinsing shall be performed by pouring the medium directly over the sampling equipment. When sampling for metals, decontamination must include a nitric acid rinse. The EPA Region IX sample plan guidance document[3] provides additional decontamination procedure guidance. Alternative decontamination procedures may be approved, but must be specified in the Work Plan.

Sampling equipment shall be dedicated to a well or be adequately decontaminated between use or be made of disposable material. If sampling equipment cannot be dedicated to a well, the reason shall be documented in a field logbook and a sample of the final rinsate shall be analyzed as a rinsate blank at a frequency of one per day for all sample parameters. If sampling equipment cannot be dedicated to a well and is to be decontaminated between use, the wells must be sampled in order of anticipated increasing contamination.

SAMPLING

This section describes minimum procedures for groundwater and soil sampling. These procedures outline basic steps required during sampling. A detailed summary of the sampling to be followed on the owner/operator site must be documented in the Work Plan and approved by the LARWQCB before sampling.

GROUNDWATER

Procedures to be used for groundwater sampling are outlined in the Practical Guide for Groundwater Sampling and RCRA Groundwater Monitoring Technical Enforcement Guidance Document.[6,7] All groundwater samples shall be poured directly into the sample containers. Groundwater samples for metals analysis shall be filtered through a 0.45-micron membrane filter and preserved immediately after collection and then cooled to 4°C until analysis.

Samples for volatile organic compound (VOC) analysis shall be collected using either a bladder pump or bottom-loading stainless steel or Teflon bailer with a bottom emptying device and a flow control device for the bottom of the bailer. Vials shall be filled by pouring the sample down the sides of the container with as little turbulence as possible. Vials shall be filled completely and immediately capped without any air space in the vial. The vial shall then be capped, turned upside down, and tapped to check for air bubbles. If an air bubble is trapped in the vial, a new sample must be collected; the remaining sample is not to be topped off. For VOC analysis, two vials shall be collected per sample; however, they shall not be composited or mixed.

SOILS

General soil sampling procedures are outlined in Soil Sampling Quality Assurance User's Guide.[8] Soil borings shall be logged for soil type according to the Unified Soil Classification System (USCS). Only discrete, undisturbed soil samples shall be sent to the laboratory for analysis. For VOC analysis, samples shall not be mixed or composited. In cases where multiple soil analyses are required (i.e. VOCs and metals or total petroleum hydrocarbons [TPH]), either duplicate soil samples must be obtained for the additional analyses, or the samples must be analyzed for VOCs and TPH-Gas (if applicable) before any other analyses are conducted; samples used for field screening are not to be submitted to laboratories for analysis. Boring logs should contain all pertinent information, such as:

- Odors
- Organic vapor analyzer (OVA) data
- Sample recovery in sampling sleeves (percent)

SAMPLE LOCATIONS

All monitoring well locations shall be reported in Universal Transverse Mercator coordinates and the datum must be specified. The locations shall be surveyed to the nearest 1.0 foot horizontally and to the nearest 0.01 foot vertically. Survey field notes and closure calculations shall be recorded in a field logbook.

QA/QC REQUIREMENTS

Before proceeding with field sampling or analysis, specific goals shall be established for the quality of the data to be collected. The number and type of QA/QC samples necessary to verify that the goals are met shall be determined. Procedures to be used for determining data quality objectives are outlined in the Data Quality Objectives for Remedial Response Activities.[9]

Data quality is typically expressed in terms of accuracy and precision. "Accuracy" is the nearness of a result to the true value.[10] Accuracy may be expressed by means of a reference sample or the percent recovery of a spiked sample. "Precision" is the measurement of agreement of a set of replicate results among themselves regardless of the true result.[10]

The Work Plan shall identify acceptable levels of precision, accuracy, and blank contamination (in terms of a specified relative percent difference of duplicates or duplicate matrix spikes, a range of percent recovery of matrix spikes, and blank acceptance criteria, respectively) for all field analysis. The laboratories shall submit similar information as identified by the laboratory requirement checklist.

FIELD ACTIVITIES

INSTRUMENT CALIBRATION AND MAINTENANCE

Calibration and maintenance shall be performed according to the manufacturer's specifications. With some instrumentation, such as electronic water level indicators, this may only require verifying that the instrument is working properly before use.

With instrumentation such as pH and conductivity meters, calibration of the instrument shall be performed, at a minimum, at the beginning and at the end of each day and once per every 10 samples. Calibration of all instruments shall be performed so that standards bracket the expected range of the samples. The calibration of all instrumentation shall be documented in the field logbook. If an instrument does not work properly, any corrective actions taken to fix the instrument shall be noted. If the corrective actions do not fix the problem, another instrument shall be obtained before proceeding with the sampling.

BLANK SAMPLES

Blank samples are designed to monitor the introduction of contamination from outside sources into the sample.

Field blanks are composed of analyte-free water. There are two types of field blanks: equipment blanks and travel blanks. An equipment blank is analyte-free water that is poured into or pumped through decontaminated sampling equipment and collected in sampling containers.[7] The equipment blank will identify sample contamination that is associated with improper sample equipment decontamination, bottle contamination, or contamination associated with bottle or sample shipment. The equipment blank will not, on its own, identify the exact source of contamination.

A volatile travel blank for volatile organic analysis is prepared in the laboratory by filling sample containers with analyte-free water and shipping the blank to the site along with the empty sample containers. The travel blank is carried to the well along with the empty sample containers, set next to the well during sampling, and then shipped with the samples to the laboratory for analysis. At no time is the travel blank to be opened during sampling. The travel blank provides information regarding sample contamination from sample transport and site conditions.

By analyzing equipment blanks, travel blanks, and laboratory method blanks, it is possible to deduce whether contamination originated from sampling and improper equipment decontamination or from unclean sample containers, sample shipment, or site conditions.

At least one equipment blank/day/sample crew is required for each parameter analyzed, for each matrix sampled (if more than one matrix is being sampled), and for each laboratory being used. A travel blank is required with each shipment of samples for volatile analysis only when no other blank is analyzed.[11] The water to be used for field blanks should meet American Society for Testing and Materials standards for Type II water[12] and is often obtained from the laboratory performing the analyses. Because of the unavailability of a clean medium for soil blank analyses, field blanks are not typically collected. All blanks submitted for analysis shall be labeled the same as a regular sample to prevent the laboratory from identifying it and handling it differently.

REPLICATE SAMPLES

A field replicate is a second sample collected from the same location. The field replicate sample provides the data user with information about the measure of precision between the two samples. A lack of precision may indicate that the sample matrix is not homogeneous or that the sampling and analytical procedures are not capable of providing consistent results. If the results of replicate analyses do not fall within the control limits specified for the analysis, actions shall be taken to correct the situation; the data can only be used as long as the limitations are recognized. Field replicate samples shall be collected at a rate of one sample per week or 10 percent/ parameter/matrix/laboratory/site, whichever is greater.[3]

Field replicate samples are collected by filling sample and replicate containers from the same sample. Samples collected for replicate analysis shall not be identified as

replicates to the laboratory. This will prevent special handling of the samples by the laboratory.

SPLIT SAMPLES

Split samples are typically collected to determine the comparability of results from two or more laboratories performing the same analysis or to verify the capability of one laboratory to perform an analysis. The same sampling equipment shall be used for collecting both sets of samples. Sample bottles for all laboratories should be obtained from the same source.

When it is necessary to use more than one laboratory because a single laboratory cannot provide the capacity necessary, a minimum of 10 percent of the samples shall be split and analyzed by each. Data are not comparable and should be used with caution when the results of two or more replicate samples do not agree within the limits identified in the Sampling Plan or Work Plan. If the split-sample results show a great deal of variance or one laboratory consistently shows analytes above detection limits while the other does not, a problem exists that must be corrected immediately. The affected samples must then be reanalyzed, if holding times permit, or resampled.

When collecting a split sample for soils to be analyzed for contaminants other than VOCs, the sample shall be placed on a tray and mixed well. Then the sample shall be divided into the two sets of sample containers. Samples to be tested for VOCs shall always be transferred directly from the sampling equipment to the sample container without mixing and with no void space.

LARWQCB may, at its discretion, decide to split field samples with the samplers. The data will be used to monitor sampling and analysis procedures throughout the San Gabriel Basin.

LABORATORY ACTIVITIES

This section specifies the minimum requirements owners/operators must meet to provide data of known and usable quality to LARWQCB and EPA in support of the investigations. These requirements include a laboratory certification/performance evaluation program, QA/QC documentation, and data validation.

LABORATORY CERTIFICATION

The laboratory selected to perform sample analyses shall be certified by the California Department of Health Services for the specific procedures to be performed. Groundwater samples shall be analyzed using drinking water protocols to ensure that detection limits are below state and federal maximum contaminant levels (MCLs). Soil samples shall be analyzed using SW846 protocol.

The laboratory shall have in place a documented analytical QA program. An effective QA program will include QC procedures that should be followed on a daily basis to reduce variability and errors, identify and correct measurement problems, and provide a statistical measure of data quality. The basic requirements for a QA/QC program are described in Test Methods for Evaluating Solid Waste.[10] Data whose quality does not meet the requirements of this document, regardless of laboratory certification, shall be excluded.

LABORATORY QA/QC DOCUMENTATION

Laboratory QA/QC documentation requirements (for non-CLP laboratories to meet CLP documentation requirements) are summarized in Appendix B.

Owners/operators may wish to reduce analytical costs by specifying lower levels of QA/QC documentation for selected samples. Approval by the LARWQCB for lower levels of QA/QC documentation is required prior to field sampling. Any request for lower levels of QA/QC documentation must be accompanied by a fully executed waiver statement, presented in Appendix C.

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Appendix A
FIELD CHECKLIST FOR THE QA/QC GUIDANCE DOCUMENT FOR SAN GABRIEL AND SAN FERNANDO BASINS

FIELD CHECKLIST FOR THE QA/QC GUIDANCE DOCUMENT FOR SAN GABRIEL AND SAN FERNANDO BASINS

This checklist is for the field activities outlined in the U.S. Environmental Protection Agency Quality Assurance/Quality Control Guidance Document for San Gabriel and San Fernando Basins,

Site Name

_____

Name and Date of Document

_____

_____

SAMPLE CONTROL

Unique identifier assigned to each sample	Yes/No
Unique identifier assigned to QC samples (field banks and replicates)	Yes/No
Identify samples to be used for lab QC (lab spikes and duplicates)	Yes/No
Sample tags or labels attached to each sample (including sampler's signature, date and time of sample collection, sample identifier, and grab/composite sample)	Yes/No
Chain-of-Custody Record	Yes/No
Custody seals	Yes/No
Receipt for split samples	Yes/No

Comments:

_____

_____

_____

_____

_____

DOCUMENT CONTROL

Bound field logbooks with numbered pages — Yes/No

Corrections made by drawing a single line through the error, date and time — Yes/No

Original documentation to be submitted to LARWQCB at completion of project — Yes/No

Comments:

SAMPLING HANDLING

Appropriate sample containers used — Yes/No

Containers from source with documented cleaning procedures — Yes/No

Correct preservative used — Yes/No

Appropriate federal and state regulations for shipping followed — Yes/No

Comments:

SAMPLING PROCEDURES

Calibration, maintenance, and operating procedures for all field equipment, and sampling activities recorded in logbook	Yes/No
Decontamination of sampling equipment: nonphosphate detergent wash, deionized water rinse, reagent-grade solvent rinse, acid rinse (for metals samples), 3 rinses with deionized water	Yes/No
Appropriate sampling procedures used (see Field Sampling Plan)	Yes/No
Discrete, undisturbed samples to be taken, sealed, and transported to the lab	Yes/No
Vials for volatile organic compound (VOC) analysis to be filled with no head space	Yes/No
No mixing or compositing soil samples for VOC analysis	Yes/No
Two vials collected for each water sample for VOC analysis, bailers used, stainless steel or Teflon, bottom loading, with flow control device	Yes/No
Preservation of samples immediately after sample collection	Yes/No
No filtering of samples for organic analysis	Yes/No
Filtering for other samples, when required, immediately after sample collection	
All soil borings logged to provide soil types per Unified Soils Classification System	Yes/No
Groundwater monitoring well locations surveyed to the nearest foot horizontally and to the nearest 0.01 foot vertically, and tied to the Universal Transverse Mercator datum	Yes/No

QUALITY CONTROL SAMPLES

Comments:

_____

_____

_____

_____

Contamination limits for blank samples, and precision and accuracy control limits specified	Yes/No
Corrective action procedures specified when results do not meet QC limits	Yes/No
One equipment blank composed of analyte-free water/day/matrix/sample crew (none required for soil)	Yes/No
One field replicate sample per week or 10 percent/parameter/matrix/laboratory/site	Yes/No
Ten percent split samples if more than one laboratory	Yes/No

Comments:

_____

_____

_____

Overall Comments/Followup Actions:

_____

_____

_____

_____

_____

Name of Reviewer Date

Appendix B
LABORATORY DOCUMENTATION REQUIREMENTS FOR DATA VALIDATION

TABLE OF CONTENTS

INTRODUCTION

In all hazardous site investigations, it is essential to know the quality of the data used for decision-making purposes. The process of generating data of known quality begins in the planning stages when data quality objectives (DQOs) are established, continues during sample collection activities and laboratory analysis, and is completed by validating the analytical data. This document was created to identify the specific laboratory documentation requirements necessary for data validation.

Validation of data requires that appropriate QA/QC and documentation steps be performed in both the lab and the field. Professionals trained in data validation procedures review this information, "flag" data with qualifiers when QA/QC criteria are not met, and prepare the data validation report.

The "P.K. Memo" and ICF/ESAT documents, which have previously addressed non-CLP documentation requirements, have been incorporated into this document. The general requirements are discussed here, but for ease of use it has been formatted into two (2) sections, pertaining to the organic and inorganic analyses. In addition to the documentation requirements, a new and separate section for non-CLP QA/QC requirements was created.

The documentation provided by the laboratory in conjunction with the sample results, allows for the evaluation of the following indicators of data quality:

- Integrity and stability of the samples
- Instrument performance during sample analysis
- Possibility of sample contamination
- Identification and quantitation of analytes
- Precision
- Accuracy of the analytical results

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I. ORGANIC ANALYSES

I.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative
- Chain-of-Custody documentation
- Summary of results for environmental samples (including quantitation limits)
- Summary of QA/QC results
- Raw data

I.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification
- Parameters analyzed for each sample and the methodology used: when applicable, cite EPA method numbers
- Whether the holding times were met or exceeded
- Detailed description of all problems encountered
- Discussion of possible reasons for any QA/QC criteria outside acceptance limits
- Observations regarding any occurrences which may affect sample integrity or data quality

I.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form. Any internal laboratory tracking document should be included.

I.D. Summary of Environmental Results

The following information is to be included in the summary of results for each environmental sample. The summary should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Client's sample identification and the corresponding laboratory identification
- Sample matrix
- Date of sample extraction, as applicable
- Date and time of analysis
- Identification of the instrument used for analysis
- GC column and detector specifications
- Weight or volume of sample used for analysis/extraction
- Dilution or concentration factor for the samples
- Percentage of moisture in the soil samples
- Method detection limits (MDL) or sample quantitation limits
- Definitions for any data qualifiers used
- Analytical results

I.E. Summary of QA/QC Results

The following QA/QC results will be presented in a summary. These summaries should follow the CLP format, if possible. Other formats may be acceptable provided that all necessary information is included and the summary is easy to follow. These summaries will require to have all the information stated in Section I.D.

I.E.1. Instrument Calibration (for each instrument used)

Initial Calibration

Report the concentrations of the initial calibration standards and the date and time of analysis. List the response factor (RF), percent relative standard deviation (%RSD), and retention time (for GC analyses) for each analyte.

Daily Calibration and Mid-level Standard

Report the concentration of the calibration standard used for the daily calibration and for the mid-level standard, and the date and time of analysis. List the response factor (RF), percent difference (%D), and retention time (for GC analyses) for each analyte.

I.E.2. Method Blank Analysis

List the environmental samples and QC analyses associated with each method blank. Report the concentrations of any analytes found in the method blanks.

I.E.3. Surrogate Standard Recovery

Report the name and concentration of each surrogate compound added. List the percent recoveries of all surrogates in the samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses.

I.E.4. Precision and Accuracy

- Matrix spike/matrix spike duplicate (MS/MSD) analysis

Report the name and concentration of each spiking compound. Samples are to be spiked with all specified compounds of interest. List the sample results, spiked sample results, percent recovery and the relative percent difference (RPD).

- Laboratory duplicate analysis, as applicable.

Report the relative percent difference (RPD) between duplicate analyses.

- Laboratory QC check sample analysis

Report the percent recovery for each analyte in the laboratory QC check sample. List the acceptable control limits.

I.E.5. Other QC Criteria

- Retention time windows determination (GC)

Report the retention time window for each analyte, for both primary and confirmation analyses.

Retention time windows are established by performing 3 analyses of standards for all analytes being measured throughout the course of a 72-hour period. The retention time window is defined as plus or minus 3 times the standard deviation of the absolute retention time. Retention time windows are to be updated daily.

- Compound identification (GC)

Report the retention times and the concentrations of each analyte detected in the samples for both primary and confirmation analyses.

- Method detection limits (MDL) determination

List the method detection limits.

Method detection limits are determined by performing at least 7 analyses of standards for all analytes measured at 2-5 times the required detection limit concentrations. The method detection limits are calculated as 3 times the standard deviation of the measured values. Refer to 40 CFR Part 136 Appendix B.

I.F. Raw Data

I.F.1. GC Analyses

This section shall include legible copies of the raw data for the following:

- Environmental samples (arranged in increasing client's sample number order).

The raw data for both the primary and confirmation analyses are to be included.

- Instrument calibrations

- QC analyses

- Sample extraction and clean-up logs
- Instrument analysis logs for each instrument used
- GC/MS confirmation, as applicable

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names)
- Area print-outs or quantitation reports

I.F.2. GC/MS Analyses

This section shall include legible copies of the raw data for the following:

- Environmental samples (arranged in increasing client's sample number order)
- Mass and spectrometer tuning and mass calibration (BFB; DFTPP)
- Initial and continuing instrument calibrations
- QC analyses
- Sample extraction and clean-up logs
- Instrument analysis logs for each instrument used

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names)
- Enhanced spectra of target analytes and tentatively identified compounds (TICs), with the associated best-match spectra
- Quantitation reports

Legible copies of the raw data shall be organized systematically, and each page shall be numbered. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections I.D. and I.E.

I.C. SUMMARY OF DOCUMENTATION REQUIREMENTS

Organic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Chain-of-Custody forms
2. Internal tracking documents, as applicable

Section III. Summary of Results - Forms for the following:

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QA/QC Results Summaries

1. Initial calibration
2. Continuing calibration
3. Method blanks
4. Surrogate recoveries
5. Matrix spike (MS)
6. Laboratory duplicate or matrix spike duplicate (MSD)
7. Laboratory QC check sample, if applicable
8. Retention time windows
9. Method detection limits (MDL)

Section V. Raw Data - chromatograms and area/quantitation reports

1. Environmental samples (include dilutions and re-analyses)
2. Instrument tuning, for mass spectrometry (GC/MS) analyses
3. Initial calibration
4. Continuing calibration
5. Method blanks
6. Surrogate recoveries
7. Matrix spike (MS)
8. Laboratory duplicate or matrix spike duplicate (MSD)
9. Laboratory QC check sample, as applicable
10. Retention time windows
11. Percent moisture for soil samples
12. Sample extraction and clean-up logs
13. Instrument analysis log for each instrument used

II. INORGANIC ANALYSES

II.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative
- Chain-of-Custody documentation
- Summary of results for environmental samples (including quantitation limits)
- Summary of QA/QC results
- Raw data

II.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification
- Parameters analyzed for each sample and the methodology used; when applicable, cite EPA method numbers
- Whether the holding times were met or exceeded
- Detailed description of all problems encountered
- Discussion of possible reasons for any QA/QC criteria outside acceptance limits
- Observations regarding any occurrences which may affect sample integrity or data quality

II.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form.

II.D. Summary of Environmental Results

The following information is to be included in the summary of results for each environmental sample. The summary should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Client's sample identification and the corresponding laboratory identification
- Sample matrix
- Date of sample digestion, as applicable
- Date and time of analysis
- Identification of the instrument used for analysis
- Instrument specifications
- Weight or volume of sample used for analysis/digestion
- Dilution or concentration factor for the samples
- Percentage of moisture in the soil samples
- Instrument detection limits (IDL) or method detection limits (MDL)
- Definitions for any data qualifiers used
- Analytical results

II.E. Summary of QA/QC Results

The following QA/QC results will be presented in a summary. These summaries should follow the CLP format, if possible. Other formats are acceptable provided that all necessary information is included and the summary is easy to follow. These summaries will require to have all information stated in Section II.D.

II.E.1. Instrument Calibration

The order of reporting of calibrations for each analyte must follow the temporal order in which the standards were analyzed.

Initial Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, and the percent recovery for each element analyzed. Record the date and time of analysis.

Continuing Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, and the percent recovery for each element analyzed. Record the date and time analysis.

Report results for (low-level) standards used to verify instrument sensitivity (that the reported detection limits can be achieved) in the manner described for continuing calibration verification.

II.E.2. Method Blank Analysis

Report analyte concentrations found in the initial calibration blank (ICB), the continuing calibration blank (CCB), and in the preparation blank. Record the date and time of analysis.

The order of reporting ICB and CCB for each analyte must follow the temporal order in which the blanks were analyzed.

II.E.3. ICP Interference Check Sample

Identify the source for the interference check sample. Report the true value, the initial and final results and the calculated percent recovery.

II.E.4. Precision and Accuracy

- Matrix spike (MS) analysis

Report the concentration of the spiked sample result, the sample result and the spiking solution added for each element in the predigestion spike. Calculate and report the percent recovery and list the control limits.

- Post Digest Spike

In addition to matrix spikes, post-digest spikes are analyzed during furnace analysis. Report the concentration of the spiked sample result, the sample result, and the spiking

solution added for each element. Calculate and report the percent recovery and list the control limits.

- Laboratory Duplicate Analysis

Report the original concentration, duplicate concentration and relative percent difference (RPD). List the control limits.

- Laboratory Control Sample

Identify the source for the laboratory control sample. Report the concentration of the spiked sample result, the sample results and the spiking solution added for each element analyzed. Calculate and report the percent recovery and list the control limits.

The laboratory control check sample is prepared in the same way as the analytical samples.

II.E.5. Other QC Criteria

- Method of Standard Additions (MSA)

This summary must be included when MSA analyses are required. Report the absorbance values with corresponding concentration values. Report the final analyte concentration and list the correlation coefficient.

- ICP serial dilution

Report the initial and serial dilution results and the percent difference.

- ICP Linear Ranges

For each instrument and wavelength used, report the date on which the linear ranges were established, the integration time, and the upper limit concentration.

- ICP Interelement Correction Factors

For each instrument and wavelength used, report the date on which the correction factors were determined. List the interelement correction factors for Al, Ca, Fe, Mg and any other element and the analytes to which they are applied.

- Instrument detection limits (IDL) determination

List the instrument detection limits.

Instrument detection limits are determined by multiplying by 3, the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution at a concentration 3-5 times the required detection limit concentrations, with 7 consecutive measurements per day. Refer to the 40 CFR Part 136 Appendix B.

II.F. Raw data

This section shall include legible copies of the raw data for the following:

- Environmental samples (arranged in increasing client's sample number order)
- Instrument calibrations
- QC analyses
- Sample preparation and digestion logs
- Instrument analysis logs for each instrument used
- Percent moisture in the soil samples

The raw data for each analysis shall include the following:

- Measurement print-outs and quantitation reports for each instrument used
- Absorbance, titrimetric, or other measurements for wet chemical analysis

Legible copies of the raw data shall be organized systematically, and each page shall be numbered. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections II.D. and II.E.

II.G. SUMMARY OF DOCUMENTATION REQUIREMENTS

Inorganic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Chain-of-Custody forms
2. Internal tracking documents, as applicalbe

Section III. Summary of Results - Forms for the following:

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QA/QC Result Summaries

1. Initial and continuing calibrations
2. Method blanks, continuing calibration blanks, and prep blanks
3. ICP interference check sample
4. Matrix spike
5. Laboratory duplicate
6. Laboratory control sample
7. Method of standard additions
8. ICP serial dilution
9. Instrument detection limits
10. ICP linear range

Section V. Raw Data - sequential measurement readout records for ICP, graphite furnace AA, flame AA, cold vapor mercury, cyanide, and/or other inorganic analyses.

1. Environmental samples (including dilutions and reanalyses)
2. Initial and continuing calibrations
3. Continuing calibration and Preparation blanks
4. Matrix spikes
5. Post digest spikes
6. Method of standard additions, when applicable
7. Laboratory duplicate or matrix spike duplicates
8. ICP Serial Dilution
9. Laboratory control samples, when applicable
10. Percent moisture for soil samples
11. Sample digestion and/or sample preparation logs
12. Instrument analysis log, for each instrument used
13. Instrument tuning for ICP-MS, when applicable

III. QC REQUIREMENTS SUMMARY

III.A. GC/MS Organic Analyses

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. Instrument Tuning

   - At the beginning of each day that samples are analyzed

2. Initial Calibration

   - At the beginning of the QC program
   - Whenever percent difference (%D) of the response factors for specified compounds of interest or calibration check compounds (CCC; a minimum of 5 compounds total) between continuing calibration and initial calibration exceeds ±25%
   - Whenever the response factors for specified compounds of interest or system performance check compounds (SPCC; a minimum of 5 compounds total) are less than 0.300 (0.250 for bromoform) for volatiles or less than 0.050 for semi-volatiles analyses
   - After installation of a new column or after maintenance service/repair of the gas chromatography/mass spectrometry (GC/MS)

3. Continuing Calibration

   - Prior to the analysis of environmental samples, on each 12-hour shift that samples are analyzed

4. Method Blank

   - Volatiles: After each continuing calibration analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination.
   - Semi-volatiles: One for each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis.

- Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. Calibration Range

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. Surrogate Standard

- Surrogate standards (3 for volatiles; 3 phenolic and 3 neutral compounds for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. Internal Standard

- Internal standards (3 for volatiles and 6 for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples.

- If the extracted ion chromatogram profile (EICP) area for any of the internal standards changes by a factor of two (-50% to +100%) from the last continuing calibration, re-analysis of the samples is required after corrective action.

8. Matrix Spike (MS) Analysis

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix

- MS solutions are to contain all specified compounds of interest.

9. Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix

10. Laboratory QC Check Sample

- At the beginning of the QC program and as needed

11. Method Detection Limits Determination

- At the beginning of the QC program and as needed

III. QC REQUIREMENTS SUMMARY

III.B. Pesticides/PCBs

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. Initial Calibration

   - At beginning of the QC program
   - Whenever the percent difference (%D) in calibration factors (CF) between continuing calibration and initial calibration exceeds ±15%
   - After installation of a new column or after maintenance service/repair of the gas chromatography (GC)

2. Daily Calibration

   - Prior to the analysis of environmental samples, on each day that samples are analyzed

3. Mid-level Standard

   - After each group of 10 samples
   - Report the percent breakdown for 4,4'-DDT and for endrin.

4. Method Blank

   - For each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis.
   - Method blanks must demonstrate that the analytical system is free of contaminants and interfering peaks.

5. Calibration Range

   - For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. Surrogate Standard

- Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. Matrix Spike (MS) Analysis

- For each extraction batch of 20 or fewer samples, for each sample matrix
- MS solutions are to contain all specified compounds of interest.

8. Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis

- For each extraction batch of 20 or fewer samples, for each sample matrix

9. Laboratory QC Check Sample

- At beginning of the QC program and as needed

10. Retention Time Windows Determination

- For each GC column, to be updated daily

11. Method Detection Limits Determination

- At beginning of the QC program and as needed

III. QC REQUIREMENTS SUMMARY

III.C. Purgeable Organics by GC

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. Initial Calibration

   - At beginning of the QC program
   - Whenever the percent difference (%D) in calibration factors (CF) between continuing calibration and initial calibration exceeds ±15%
   - After installation of a new column or after maintenance service/repair of the gas chromatography (GC)

2. Daily Calibration

   - Prior to the analysis of environmental samples, on each day that samples are analyzed

3. Mid-level Standard

   - After each group of 10 samples

4. Method Blank

   - After each daily calibration and mid-level standard analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination.
   - Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. Calibration Range

   - For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. Surrogate Standard

   - Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. Matrix Spike (MS) Analysis

   - For each analysis batch of 20 or fewer samples, for each sample matrix
   - MS solutions are to contain all specified compounds of interest.

8. Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis

   - For each analysis batch of 20 or fewer samples, for each sample matrix

9. Laboratory QC Check Sample

   - At beginning of the QC program and as needed

10. Retention Time Windows Determination

    - For each GC column, to be updated daily

11. Method Detection Limits Determination

    - At beginning of the QC program and as needed

III. QC REQUIREMENTS SUMMARY

III.D. Metals Analyses

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. Initial Calibration

   - Daily and each time the instrument is set up
   - Whenever the percent difference between the initial calibration and the continuing calibration exceeds 10% (20% for mercury)
   - Whenever the percent difference between either of the ICP interference check samples and the true value exceeds 20%
   - Blank standard required as part of initial calibration

2. Continuing Calibration Verification Standard

   - After every ten or fewer samples
   - Analyses are required to have calibrations with acceptable recoveries (the percent difference between the initial calibration and the continuing calibration less than 10% [20% for mercury]) before and after the sample analysis.

3. Blanks

   - Continuing calibration blank run immediately following continuing calibration verification standard
   - Method blank for each preparation batch of 20 or fewer samples, for each sample matrix

4. ICP Interference Check Sample

   - At the beginning and at the end of the analytical run
   - ICP analyses are required to have both ICP interference check samples with acceptable recoveries (the percent difference between the true value and the ICP interference check sample less than 20%).

5. Calibration Range

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. Matrix Spike (MS) Analysis

- For each preparation batch of 20 or fewer samples, for each sample matrix
- MS solutions are to contain all specified compounds of interest.

7. Sample Duplicate Analysis

- For each preparation batch of 20 or fewer samples, for each sample matrix

8. Laboratory Control Sample (LCS)

- For each preparation batch of 20 or fewer samples, for each sample matrix
- Analyses are required to have the laboratory check sample with acceptable recoveries (the percent difference between the true value and the laboratory check sample less than 20%).
- Laboratory control samples are not required for mercury or cyanide determinations.

9. Graphite Furnace Post Digest QC

- A post digest spike at 10 to 20 ug/L is required for all furnace analyses. If the result is greater than or equal to 10 ug/L in the digestate and the recovery of the spike is not within 85% to 115%, the method of standard additions is required to be used.
- If the method of standard additions correlation coefficient is less than 0.995, the method of standard additions analysis is required to be repeated once.

10. ICP Serial Dilution

- For each preparation batch of 20 or fewer samples, for each sample matrix, dilute the digestate by five and re-analyze.

Appendix C
WAIVER FOR NON-CLP DOCUMENTATION OF DATA

WAIVER FOR NON-CLP DOCUMENTATION OF DATA

For the purposes of any administrative or judicial action, _____ [name of individual or corporation] (owner/operator) hereby waives any evidentiary objection as to the authenticity and validity of data gathered or generated pursuant to this _____ [type of document] that has been verified using the Quality Assurance and Quality Control procedures specified in Section ____ of this document. Owner/operator also hereby waives any objections to the introduction of such data based on hearsay.

The undersigned representative of owner/operator certifies that he or she is fully authorized by owner/operator to enter into and execute the terms and conditions of this waiver, and to legally bind owner/operator to this waiver.

_____
Signature

_____
Name (Printed)

_____
Title

_____
Date

Appendix D

LABORATORY REPORT FORM 10A AND FORM 10B

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

LABORATORY REPORT FORM

Laboratory Name:_____

Address:_____

Telephone:_____

Laboratory Certification
(ELAP) No.:_____ Expiration Date: _____

Laboratory Director's Name (Print):_____

Laboratory Director's Signature:_____

Client:_____
Project No.:_____

Analytical Method: (Circle One)	EPA 502.1	EPA 503.1	EPA 502.2	EPA 524.1
				EPA 524.2
	EPA 601	EPA 602		EPA 624
	EPA 8010	EPA 8020	EPA 8021	EPA 8240
				EPA 8260
Other	_____	_____	_____	_____
Date Sampled:	_____	_____	_____	_____
Date Received:	_____	_____	_____	_____
Date Reported:	_____	_____	_____	_____
Sample Matrix:	_____	_____	_____	_____
Extraction Method:	_____	_____	_____	_____
Extraction Material:	_____	_____	_____	_____

Chain of Custody Received: Yes No
Sample Condition:

-- Sample Headspace Description (%):
-- Sample Container Material:

_____
_____
_____
_____

(RWQCB LabForm10A;Ves11/92)

ANALYTICAL TEST RESULT*

Reporting Unit (Circle One): µg/kg µg/l

DATE ANALYZED					
DATE EXTRACTED					
DILUTION FACTOR					
LAB SAMPLE I.D.					
CLIENT SAMPLE I.D.					
COMPOUND[b]	MDL	MB			
Bromobenzene					
Bromodichloromethane					
Bromoform					
Bromomethane					
Carbon tetrachloride					
Chloroethane					
Chloroform					
1-Chlorohexane					
Chloromethane					
Dibromochloromethane					
Dibromomethane					
Dichlorodifluoromethane					
1,1-Dichloroethane (1,1-DCA)					
1,2-Dichloroethane (1,2-DCA)					
1,1-Dichloroethylene (1,1-DCE)					
trans-1,2-Dichloroethylene					
Dichloromethane					
1,2-Dichloropropane					
cis-1,3-Dichloropropylene					
trans-1,3-Dichloropropylene					
1,1,1,2-Tetrachloroethane					
1,1,2,2-Tetrachloroethane					
Tetrachloroethylene (PCE)					
1,1,1-Trichloroethane (111-TCA)					
1,1,2-Trichloroethane (112-TCA)					
Trichloroethylene (TCE)					
1,2,3-Trichloropropane					
Trichlorofluoromethane					
Vinyl chloride					
Benzene					
Chlorobenzene					
1,2-Dichlorobenzene					
1,3-Dichlorobenzene					
1,4-Dichlorobenzene					
Ethyl benzene					
Toluene					

ANALYTICAL TEST RESULT (cont'd)

COMPOUND[b]	MDL	MB			
m,p-Xylenes					
o-Xylene					
Acetone					
Acrolein					
Acrylonitrile					
Bromochloromethane					
n-Butylbenzene					
sec-Butylbenzene					
tert-Butylbenzene					
2-Chloroethylvinyl ether					
2-Chlorotoluene					
4-Chlorotoluene					
Dichlorodifluoromethane					
cis-1,2-Dichloroethylene					
1,3-Dichloropropane					
2,2-Dichloropropane					
1,1-Dichloropropylene					
Ethylene dibromide (EDB)					
Hexachlorobutadiene					
Isopropylbenzene					
p-Isopropyltoluene					
Methyl Ethyl Ketone					
Methyl Isobutyl Ketone					
Naphthalene					
n-Propylbenzene					
Styrene					
1,2,3-Trichlorobenzene					
1,2,4-Trichlorobenzene					
1,2,4-Trimethylbenzene					
1,3,5-Trimethylbenzene					
1,1,2-Trichloro-trifluoroethane					

SURROGATE	SPK CONC	ACP%	MB %RC	%RC	%RC	%RC

a = Report Any Value ≥ MDL; b = Listed Compounds Are Ordered by Laboratory Analytical Methods: Halogenated, Aromatic, then Remaining Compounds Identified by GC/MS.
SPK CONC = Spiking Concentration (≤5 x PQL); ACP % = Acceptable Range of Percent; %RC = % Recovery
MDL = Method Detection Limit; MB = Method Blank; ND = Not Detected (Below MDL); NA = Not Analyzed

QA/QC REPORT

Reporting Unit (Circle One): µg/kg µg/l

I. Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

DATE PERFORMED:_____
BATCH #:_____
LAB SAMPLE I.D.:

ANALYTE	SPK CONC	MS	% MS	MSD	% MSD	RPD	ACP %MS	ACP RPD

II. Laboratory Quality Control Check Sample

DATE PERFORMED:_____
BATCH #:_____
LAB SAMPLE I.D.:

ANALYTE	SPK CONC	RESULT	%RECOVERY	ACP %
				80-120
				80-120
				80-120
				80-120
				80-120
				80-120
				80-120
				80-120

ANALYST:_____ DATE:_____

III. Calibration Standard

MOST RECENT INITIAL CALIBRATION DATE:_____ | DAILY CALIBRATION DATE:_____

SUPPLY SOURCE: _____ _____

COMPOUND[c]	INITIAL RF_{ave}	%RSD[d]	DAILY RF	%DIFF[e] w/RF_{ave}
Bromobenzene				
Bromochloromethane				
Bromodichloromethane				
Bromoform◂				
Bromomethane				
Carbon tetrachloride				
Chloroethane				
Chloroform*				
1-Chlorohexane				
Chloromethane◂				
Dibromochloromethane				
Dibromomethane				
Dichloromethane (Methylene chloride)				
1,1-Dichloroethane◂ (1,1-DCA)				
1,2-Dichloroethane (1,2-DCA)				
1,1-Dichloroethylene* (1,1-DCE)				
trans-1,2-Dichloroethylene				
1,2-Dichloropropane*				
cis-1,3-Dichloropropylene				
trans-1,3-Dichloropropylene				
1,1,1,2-Tetrachloroethane				
1,1,2,2-Tetrachloroethane◂				
Tetrachloroethylene (PCE)				

III. Calibration Standard (cont'd)

COMPOUND[c]	INITIAL RF_{ave}	%RSD[d]	DAILY RF	%DIFF[e] w/RF_{ave}
1,1,1-Trichloroethane (1,1,1-TCA)				
1,1,2-Trichloroethane (1,1,2-TCA)				
Trichloroethylene (TCE)				
1,2,3-Trichloropropane				
Trichlorofluoromethane				
Vinyl chloride* (VC)				
Benzene				
Chlorobenzene◂				
1,2-Dichlorobenzene				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				
Ethyl benzene*				
Toluene*				
m,p-Xylenes				
o-Xylene				
Acetone				
Acrolein				
Acrylonitrile				
n-Butylbenzene				
sec-Butylbenzene				
tert-Butylbenzene				
2-Chloroethylvinyl ether				
2-Chlorotoluene				
4-Chlorotoluene				
Dichloro-difluoromethane				
cis-1,2-Dichloroethylene				
trans-1,2-Dichloroethylene				
1,3-Dichloropropane				
2,2-Dichloropropane				
1,1-Dichloropropylene				
Ethylene dibromide(EDB)				
Hexachlorobutadiene				
Isopropylbenzene				

III. Calibration Standard (cont'd)

COMPOUND[c]	INITIAL RF_{ave}	%RSD[d]	DAILY RF	%DIFF[e] w/RF_{ave}
p-Isopropyltoluene				
Methyl Ethyl Ketone				
Methyl Isobutyl Ketone				
Naphthalene				
n-Propylbenzene				
Styrene				
1,2,3-Trichlorobenzene				
1,2,4-Trichlorobenzene				
1,2,4-Trimethylbenzene				
1,3,5-Trimethylbenzene				
1,1,2-Trichloro-trifluoroethane				

SPK CONC = Spiking Concentration (≤5 x PQL); PQL = Practical Quantitation Limit
%MS = Percent Recovery of MS; %MSD = Percent Recovery of MSD; RPD = Relative Percent Difference;
ACP = Acceptable Range of Percent; INITIAL RF_{ave} = Average Response Factor From Initial Calibration;
DAILY RF = Response Factor From Daily Calibration; %RSD = Percent Relative Standard Deviation;
%DIFF = Percent Difference; c = Listed Compounds are Ordered by Laboratory Analytical Methods: Halogenated, Aromatic, then Remaining Compounds Identified by GC/MS.
d=Value ≤10% for GC EPA Methods 500 & 600 Series, ≤20% for GC EPA Methods 8000 Series, ≤30% for GC/MS Methods.
e=Value ≤20% for GC EPA Methods 500 & 600 Series, ≤15% for GC EPA Methods 8000 Series, ≤25% for GC/MS Methods.
*=Calibration Check Compounds (CCC) for GC/MS Method;
**=System Performance Check Compounds (SPCC) for GC/MS Method

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REQUIREMENT

1. Indicate any modification made to the EPA Methods (e.g., testing constituent list, columns).
2. Provide details of corrective actions in any out of control events (e.g., re-calibration, blank contamination, etc.).
3. Co-elution must be resolved prior to reporting, except for xylenes.
4. Second column or MS confirmation must be performed for all compounds detected.
5. Analytical results are not to be blank adjusted.
6. Chemical standards for QC check samples and calibration should be obtained from different supply sources.
7. Any change of column, detector, chemical standard, etc. shall result in a new initial calibration.
8. Lowest concentration injected for initial calibration should not exceed three times of laboratory method detection limits.
9. Re-calibration is required whenever the RF from daily calibration is not within the range specified in item "e" above from initial calibration RF_{ave}.
10. Tentative identified compounds and all unidentified peaks must be reported.
11. Chromatogram for calibration standards, quality control check samples, and selected environmental samples must be submitted upon request.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

LABORATORY REPORT FORM FOR PETROLEUM HYDROCARBONS

Laboratory Name: _____

Address: _____

Telephone: _____

Laboratory Certification (ELAP) No.: _____ Expiration Date: _____

Laboratory Director's Name (Print): _____

Laboratory Director's Signature: _____

Client: _____

Project No.: _____

Analytical Method: (Circle One)	EPA 418.1	EPA 8015 (Modified)*
Other	_____	_____
Date Sampled:	_____	_____
Date Received:	_____	_____
Date Reported:	_____	_____
Sample Matrix:	_____	_____

Chain of Custody Received: Yes No

Sample Condition:

-- Sample Headspace Description (%):
-- Sample Container Material:

_____

_____

_____

_____

_____

*=Use California Health Department Method SCLB15 (8/90)

(RWQCB LabForm10B;Ves11/92)

ANALYTICAL TEST RESULT*

Reporting Unit (Circle One): µg/kg µg/l

DATE ANALYZED						
DATE EXTRACTED						
EXTRACTION METHOD						
EXTRACTION MATERIAL						
EXTRACTION DURATION (hr/min)						
DILUTION FACTOR						
LAB SAMPLE I.D.						
CLIENT SAMPLE I.D.						
PETROLEUM HYDROCARBONS	MDL	MB				
Total Petroleum Hydrocarbons (EPA 418.1)						
Gasoline (EPA 8015M)						
Jet Fuel (EPA 8015M)						
Kerosene (EPA 8015M)						
Diesel (EPA 8015M)						
Other (identified below)						

SURROGATE	SPK CONC	ACP%	MB %RC	%RC	%RC	%RC

* = Report Any Value ≥ MDL.
MDL = Method Detection Limit; MB = Method Blank; ND = Not Detected (Below MDL); NA = Not Analyzed
SPK CONC = Spiking Concentration; ACP % = Acceptable Range of Percent; %RC = % Recovery

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REQUIREMENT

1. Provide details of corrective actions in any out of control events (e.g., re-calibration, blank contamination, etc.).
2. Analytical results are not to be blank adjusted.
3. Lowest concentration injected for initial calibration should not exceed three times of laboratory method detection limits.
4. Chemical standards for QC check samples and calibration should be obtained from different supply sources.
5. Raw data for calibration standards, quality control check samples, and selected environmental samples must be submitted upon request.

QA/QC REPORT

Reporting Unit (Circle One): mg/kg mg/l

I. Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

DATE PERFORMED:_____
BATCH #:_____
LAB SAMPLE I.D.:

ANALYTE	SPK CONC	MS	% MS	MSD	% MSD	RPD	ACP %MS	ACP RPD

II. Laboratory Quality Control Check Sample

DATE PERFORMED:_____
BATCH #:_____
LAB SAMPLE I.D.:

ANALYTE	SPK CONC	RESULT	%RECOVERY	ACP %
				80-120
				80-120

III. Calibration Standard

3a. Submit Copies of Calibration Curves and Reference Standards

3b. Fill in Table Below If Quantification of Sample Result Is Based On Response Factor (RF)

COMPOUND	INITIAL CALIBRATION DATE:_____		DAILY CALIBRATION DATE:_____	
	INITIAL RF_{ave}	%RSD ≤20%	DAILY RF	%DIFF w/RF_{ave} ≤±15%

SPK CONC = Spiking Concentration;
%MS = Percent Recovery of MS; %MSD = Percent Recovery of MSD
RPD = Relative Percent Difference; ACP = Acceptable Range of Percent
INITIAL RF_{ave} = Average Response Factor From Initial Calibration
DAILY RF = Response Factor From Daily Calibration
%RSD = Percent Relative Standard Deviation; %DIFF = Percent Difference

ANALYST:_____ DATE:_____