

**Revised Quality Assurance Project Plan
Supplemental Soil Investigation
Montrose Superfund Site
20201 Normandie Avenue
Torrance, California 90502**

Prepared For: **Montrose Chemical Corporation of California
600 Ericksen Avenue, NE, Suite 380
Bainbridge Island, Washington 98110**

Prepared By: **Earth Tech, Inc.
300 Oceangate, Suite 700
Long Beach, California 90802**

March 2005

**REVISED QUALITY ASSURANCE
PROJECT PLAN
SUPPLEMENTAL SOIL INVESTIGATION
MONTROSE SUPERFUND SITE
20201 NORMANDIE AVENUE
TORRANCE, CALIFORNIA 90502**

Distribution List

_____ Susan Keydel, EPA Region IX Remedial Project Manager

_____ Jeff Dhont, EPA Region IX Remedial Project Manager

_____ Marlon Mezquita, EPA Region IX Quality Assurance Officer

_____ Joe Kelly, Montrose Chemical Corporation

_____ Paul Sundberg, Consultant to Montrose Chemical

_____ Karl Lytz, Latham & Watkins

_____ Kelly Richardson, Latham & Watkins

_____ Lee Erickson, Stauffer Management Company LLC

_____ Mike Palmer, Hargis + Associates, Inc.

_____ Safouh Sayed, Department of Toxic Substances Control

_____ Frank Gonzales, Department of Toxic Substances Control

_____ Kimiko Klein, Department of Toxic Substances Control

_____ Richard Sturn, CH2M HILL

_____ Artemis Antipas, CH2M HILL Quality Assurance Officer

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ACRONYMS

AOC	Administrative order on consent
BFB	4-bromofluorobenzene
bgs	Below ground surface
BHC	Benzene hexachloride
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CCC	Calibration check compound
CCV	Continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
COC	Chain-of-custody
COD	Coefficient of determination
CPA	Central processing area
CSF	Complete sample delivery group file
DCE	Dichloroethene
DDD	Dichlorodiphenyl-dichloroethane
DDE	Dichlorodiphenyl-dichloroethylene
DDT	Dichlorodiphenyl-trichloroethane
DNAPL	Dense nonaqueous phase liquid
DQO	Data quality objectives
EICP	Extracted ion current profile
ELCR	Excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
FID	Flame-ionization detector
FS	Feasibility study
FSP	Field sampling plan
FTL	Field team leader
GC	Gas chromatography
HI	Hazard index
HASP	Health and safety plan
ICP	Inductively coupled plasma
ICP-MS	Inductively coupled plasma mass spectrometry
ICS	Interference check solution
ICV	Initial calibration verification
ID	Identification
IDW	Investigation derived wastes
IS	Internal standard
LADWP	Los Angeles Department of Water and Power
LIMS	Laboratory information management system
LCS	Laboratory control sample
MCB	Monochlorobenzene
MCL	Maximum contaminant level
MDL	Method detection limit

µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MS	Matrix spike or mass spectrometry
MS/MSD	Matrix spike and matrix spike duplicate
NA	Not applicable or not available
ND	Non-detect
NAPL	Nonaqueous phase liquid
NPL	National priorities list
O-S	Objective-specific
PCE	Tetrachloroethene
PD	Playa deposit
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Parts per million
POTW	Publicly owned treatment works
PRG	Preliminary remediation goal
PVS	Palos verdes sands
QA	Quality assurance
QAO	Quality assurance office
QAPP	Quality assurance project plan
QASR	Quality assurance summary report
QC	Quality control
r	Correlation coefficient
RI	Remedial investigation
RF	Response factor
RL	Reporting limit
RPD	Relative percent difference
RPM	Remedial project manager
RRT	Relative retention time
RSD	Relative standard difference
RT	Retention time
RTL	Review team leader
RWQCB	Regional Water Quality Control Board
SDG	Sample delivery group
SM	Site manager
SPCC	System performance check compound
SRM	Standard reference material
STLC	Soluble threshold limit concentration
TCE	Trichloroethene
TCLP	Toxicity characteristics leaching procedure
TIC	Tentatively identified compounds
TSDF	Treatment, storage, and disposal facility
UBA	Upper bellflower aquitard

VOA	Volatile organic analysis
VOC	Volatile organic compound
WET	Waste extraction test

1.0 PROJECT MANAGEMENT/DATA QUALITY OBJECTIVES

1.1 PROJECT ORGANIZATION

Under contract with Montrose Chemical Corporation (Montrose), this Revised Quality Assurance Project Plan (QAPP) was developed by Earth Tech, Inc. (Earth Tech). The format of the Revised QAPP is consistent with requirements in U.S. Environmental Protection Agency (EPA) QA/R5 (EPA, 2001) and EPA QA/G5 (EPA, 2002). The Revised QAPP and the accompanying Revised Field Sampling Plan (FSP) (Earth Tech, 2005) will be implemented by Earth Tech working under contract with Montrose. A Montrose representative, Mr. Paul Sundberg, and an Earth Tech Site Manager (SM), Brian Dean, will work directly with the EPA Remedial Project Manager (RPM) to implement the Revised QAPP and the Revised FSP. The SM is a consultant to Montrose and will manage the financial, schedule, and technical status of the project. The key EPA personnel involved in interfacing with the SM is the RPM.

Key Earth Tech personnel include the Quality Assurance Officer (QAO), Review Team Leader (RTL), Field Team Leader (FTL), and Health and Safety Officer. Although the primary responsibility for project quality rests with the SM, independent quality control (QC) is provided by the RTL and QAO. The RTL/review team and QAO review project planning documents, data evaluation, and all deliverables. The Sampling Team will implement the Revised QAPP/FSP. The SM is responsible for ensuring adherence to the project Health and Safety Plan (HASP) (Earth Tech, 2005a) and field decontamination procedures. The entire field effort is directed by the FTL. Where quality assurance (QA) problems or deficiencies requiring special action are uncovered, the SM, RTL, and QAO will identify the appropriate corrective action to be initiated by the FTL or the laboratory.

Project organization and the line of authority for efforts are illustrated in **Figure 1**. Data users and recipients are shown in **Figure 2**. All technical personnel and QA personnel are shown.

1.2 PROBLEM DEFINITION/BACKGROUND

1.2.1 PURPOSE

This Revised QAPP has been prepared to support field and laboratory activities for a supplemental site investigation for the Montrose Chemical Superfund Site (Montrose Site) located in Torrance, California 90502. These activities are necessary to complete the feasibility study (FS) for on- and near-Property soil at the former Montrose Chemical Plant property (Property), and surrounding off-Property areas. The field activities will include collection and analysis of surface and subsurface soil samples from on-, near-, and off-Property borings.

1.2.2 PROBLEM STATEMENT

Additional surface and subsurface soil data are needed to supplement existing site data (EPA, 1998). These supplemental data are needed for the purposes of the soil FS and completion of the remedy selection process, and to complete human health risk assessments for on- and off-Property areas.

1.2.3 PHYSICAL SETTING

The Montrose Property is located at 20201 Normandie Avenue, Torrance, California 90502 as identified by the United States Postal Service. However, the area between Western and Normandie Avenues has

been identified as the City of Los Angeles, and therefore, the Montrose Property is actually located in the City of Los Angeles boundaries. It currently is unoccupied, fenced, and covered with asphalt. The entrance is at the northeast corner of the property along Normandie Avenue. The Montrose Property and other surrounding properties are shown in **Figure 3** as an aerial photograph from 2003. The only on-Property features are three large, raised, asphalt building pads that Montrose constructed in 1985 to support planned future warehouses, and five cells containing soil removed during the Kenwood Stormwater Drainage Pathway Removal Action, which are located in the western area of the property. Surface water drainage is toward the southeast corner of the Montrose Property and the Normandie Avenue Ditch and historical ponding area.

The land surrounding the Montrose Property is zoned for industrial use (City of Los Angeles, 1996). Bordering the property to the east are Normandie Avenue and the Union Pacific Railroad right-of-way. The Jones property and LADWP land border the property to the south; the Farmer Brothers plant property borders the south edge of the LADWP property. To the north and west of the Montrose Property, respectively, are the Boeing Corporation property (formerly the location of the McDonnell Douglas manufacturing plant) currently undergoing redevelopment, and the Frito-Lay Corporation distribution facility. Beyond this central industrial area, to the southeast and southwest, are areas of residential zoning.

The site-specific geology of the Montrose Property consists of reworked Playa Deposits, the Palos Verdes Sand, and Upper Bellflower Aquitard. The grading at the Montrose Property in 1985 resulted in a layer of varying thickness of reworked material across the property. The geology of this material is discussed in the next section.

Immediately underlying the surficial reworked material, at various depths across the site, are three generalized, unsaturated soil layers described as follows:

Upper Layer - Playa Deposits (PD): This layer is found near surface to depths of approximately 25 feet below ground surface (bgs). According to grain size analyses of soil samples collected in this layer silt and clay comprise more than 65 percent of these soils.

Middle Layer – Palos Verdes Sands - (PVS): This layer is found between approximately 25 and 45 feet bgs and consists primarily of fine-grained sands. According to grain size analysis of soil samples collected in this layer fine- and medium-grained sand comprise more than 70 percent of these soils.

Lower Layer – Upper Bellflower Aquitard (UBA): This layer is found between approximately 45 feet bgs and groundwater (approximately 65 feet bgs) and consists of multiple thin sand layers interbedded with layers of silts and clays. Grain size analysis of soil samples collected in this layer ranged from more than 70 percent fine-grained sand to more than 60 percent silt. This soil layer varied from fine grain sands to clays and silts with increasing depth.

The first encountered groundwater beneath the Montrose Property is at approximately 65 to 70 feet bgs in the Upper Bellflower Aquitard (EPA, 1998).

In 1984 and 1985, Montrose graded and redistributed the crushed concrete debris and top several feet of surface soil over the entire plant property using heavy earth-moving equipment. This activity included crushing concrete, digging trenches to bury debris, and performing cut-and-fill operations across the property. During grading, two large, raised pads (Building Pads A and B) were formed on the property. It was thought that these could serve as foundations for future buildings such as warehouses, which were never built. Building Pad B has both a north and south portion that is separated by a stormwater surface

channel. A third building area (Building C) was identified in the western portion of the property, but there was no large, raised pad constructed in this area.

The grading activities at the Montrose Property created three major components in the near-surface lithologic profile.

- Asphalt cover and base - The majority of the property is covered with an asphalt cover and an underlying base aggregate, approximately 0.5-foot thick. The aggregate was generated on-property by crushing the concrete debris from the facility demolition activities; samples of the crushed debris indicate that the material remains significantly contaminated with dichlorodiphenyl-trichloroethane (DDT).
- Reworked material - The reworked material, which was subject to cut and/or fill operations, consists of dark brown clayey silt, silty clay, or clay, and contains debris such as concrete fragments, gravel, red brick fragments, and wood. Pits and trenches containing demolition debris from the former plant, such as crushed footings, are present at localized positions across the property. Where these occur, they extend to as much as 15 feet bgs and into the native material. Not considering trenches, the depth of the reworked material varies across the Montrose Property, generally between 1 and 7 feet thick.
- Native material - The soil in this depth interval underlying the reworked material is native (undisturbed) soil of the Playa Deposits (see discussion of geology, above). Contamination may be present in this soil either where the reworked zone is thin or not present, or where contamination was driven (e.g., by sufficient hydraulic head such as under the wastewater recycling pond or under trenches) to a depth greater than the depth of the reworked zone.

The depths of reworked material currently existing across the Site are presented in the *Buried Debris Report*; this report also presents locations and depths of buried concrete footings, concrete debris used as fill, and crushed concrete used as aggregate beneath asphalt pavement (Earth Tech, 2003). No fill soil reportedly was brought onto the Site during grading. According to the *Buried Debris Report*, trenches were dug or deepened for deposition of concrete from demolition, and the excavated soil was used for fill.

There are five general areas within the property, and elevations of the ground surface vary between areas: Building Pads A, B, and C, the roadway areas, and the loading dock areas. Thickness of reworked material is reported to be: 6 to 6.5 feet within the elevated pad referred to as the Building A footprint (eastern property); 5 to 6 feet at the elevated pad referred to as the Building B footprint (central property, including the Central Processing Area [CPA]); approximately 0.7 to 3 feet in the elevated pad referred to as the Building C footprint (northwest corner of the property); and, approximately 1 foot in most roadway and loading dock areas (Earth Tech, 2003).

In near- and off-Property areas, fill material, including debris such as wood fragments and glass, has been identified in the near-surface soil samples collected from the perimeter of the Montrose Property, the LADWP right-of-way, the Normandie Avenue Ditch and historical ponding area, and the Farmer Brothers property.

1.2.4 SITE HISTORY AND PAST INVESTIGATIONS

In 1943, Stauffer Chemical Company (Stauffer) purchased 18 acres of land located on Normandie Avenue in Torrance, California, including what are now the Montrose and Jones properties. This property had previously been the Hughes-Mitchell plant and included a sulfuric acid plant. The sulfuric

acid plant reportedly used the Manheim furnace process; this process burns or roasts sulfide ore raw material to generate sulfur dioxide. The sulfur dioxide was then reportedly converted to sulfur trioxide, and absorbed in sulfuric acid (Levine-Fricke, 1995). From 1943 until 1951, Stauffer continued to operate the sulfuric acid plant on what is currently the Jones property, but may have switched to producing sulfuric acid by burning sulfur, which would have generated limited ash.

From 1947 to 1982, Montrose operated a DDT manufacturing plant on what came to be 13 acres. This land was leased from Stauffer. The sulfuric acid plant was dismantled after 1965. Jones leased the remaining 5 acres of the Stauffer property from 1951 until purchasing the land from Stauffer in 1968 (Levine-Fricke, 1995).

In 1982, EPA conducted a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) inspection at the Montrose plant; DDT was detected in surface water samples collected from the nearby Normandie Avenue Ditch and historical ponding area. Following the termination of the plant operations in 1982, the plant was dismantled and the majority of concrete, including footings, was excavated, crushed, and stored onsite. The demolition was completed in early 1983; in 1984 and 1985, Montrose graded and covered most of the property with asphalt. A detailed description of the grading activities can be found in the *Buried Concrete Debris and DDT-Impacted Soil Volumetric Estimates, Montrose Superfund Site Report* (referred to as the *Buried Debris Report*) (Earth Tech, 2003), and in EPA's review letter dated January 13, 2004 (EPA, 2004).

Environmental investigations of the Montrose Property continued under the oversight of EPA, and initially, the California Regional Water Quality Control Board (RWQCB), Los Angeles Region. EPA proposed the site for the Superfund National Priorities List (NPL) in 1984, and the proposal was finalized in 1989. In 1985, EPA and Montrose entered into an administrative order on consent (AOC) that required Montrose to perform a remedial investigation and feasibility study (RI/FS) for the Montrose Site. This investigation included addressing contamination in areas both on and off the former Montrose Property. The AOC was amended in 1987 and again in 1989. Portions of the RI/FS work have been taken over and completed by EPA, while other portions have been completed by Montrose. A subset of RI/FS work remains to be completed, including a feasibility study for on- and near-Property soil, addressing the soil at the Montrose Property and properties near it. In September 1999, Montrose submitted to EPA a draft Soil FS (Earth Tech, 1999), which EPA did not accept. The scope of work identified in the Revised FSP will provide data for use in revising the Soil FS and address data gaps identified by EPA.

DDT releases from plant operations impacted surface and subsurface soils at the former plant, surrounding commercial/industrial and neighborhood properties, and sediments in the sanitary sewer and Normandie Avenue Ditch and historical ponding area (adjacent to the Property). Dense nonaqueous phase liquid (DNAPL), consisting primarily of monochlorobenzene (MCB) and dissolved DDT, is present under the former plant property and is serving as a continuous source of groundwater contamination. Groundwater at the Montrose Site is contaminated with MCB and other chemicals across six hydrostratigraphic units (aquitards and aquifers) to depths up to approximately 250 feet below surface and to distances of up to approximately 1.3 miles from the former Montrose Plant.

Since the 1985 grading of the Montrose Property, many "postgrading" environmental subsurface soil investigations have taken place both on- and off-Property as part of efforts to complete the RI. A summary of findings from these investigations can be found in the RI Report (EPA, 1998).

The 1998 RI Report compiled and evaluated data collected at the Montrose Property, including data from 1981 and 1983 (before the on-Property soil was graded), as well as data collected between 1985 and 1997 (after the grading). RI sample locations were determined using a variety of techniques including grids,

transects across drainages, and near known source areas. The need to supplement these efforts is discussed in the following sections.

1.2.5 DATA NEEDS AND USES

Data needs and uses for the objectives described in this section have been identified through the data quality objective (DQO) process presented in **Appendix A**. **Table 1** presents data needed to supplement existing RI data (EPA, 1998) for upcoming risk assessment and FS tasks, and waste characterization data for waste generated under this task. Appropriate detection limits are based on project needs, applicable regulatory requirements, and available methodology.

1.3 PROJECT DESCRIPTION AND SCHEDULE

1.3.1 DESCRIPTION OF WORK TO BE PERFORMED

The field activities will include collection and analysis of surface and subsurface soil samples from on-, near-, and off-Property borings.

1.3.2 SCHEDULE OF ACTIVITIES

Drilling, sampling, and laboratory analysis are planned for 2005, prior to risk assessment and revision of the Draft Soil FS.

1.4 DATA QUALITY OBJECTIVES

1.4.1 PROJECT QUALITY OBJECTIVES

Specific DQOs were considered independently through the DQO process (EPA, 1994, updated 2000) to meet the data use needs for each activity. **Appendix A** presents the DQO decision making process for the field activities. The sampling and analyses are designed to provide data to supplement prior RI data (EPA, 1998) for purposes of risk assessment and revision of the Soil FS. Data uses and needs are summarized in **Table 1**.

1.4.2 MEASUREMENT PERFORMANCE CRITERIA

The QA objective of this plan is to develop implementation procedures that will provide data of known and appropriate quality for the needs identified based on the DQO process and according to the summary in **Table 1**. Data quality is assessed by representativeness, comparability, accuracy, precision, and completeness. Definitions of these terms, the applicable procedures, and level of effort are described below. The applicable QC procedures, quantitative target limits, and level of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical methods. Analytical parameters and target detection limits, analytical precision, accuracy, and completeness in alignment with needs identified in **Table 1** are presented in **Table 2**. Specific methods and QC procedures are described in Section 2.0 and **Appendix B**.

Target detection limits shown in **Table 2** are based on available standard methods applicable to soil and water (decontamination water samples) and are below applicable regulatory criteria shown in **Table 1**.

Reporting limits for the individual samples may be higher due to the sample-specific matrix as determined per individual sample measurements. The sample-specific reporting limits will be reported for the individual analytes. For sample-specific elevated detection levels, laboratory-specific method detection levels, along with the reporting limits, may be taken into consideration for project decisions if needed. Laboratory-specific method detection limits established based on standard methodology (40 Code of Federal Regulations [CFR] Part 136, **Appendix B**) are lower than the reporting limits. The laboratories will report non-diluted and diluted results to ensure that the lowest detection is attained for all compounds.

Representativeness is a measure of how closely the results reflect the actual concentration or distribution of the chemical compounds in the matrix samples. Sampling plan design, sampling techniques, and sample handling protocols (e.g., for storage, preservation, and transportation) have been developed and are discussed in subsequent sections of this document. The proposed documentation will establish that protocols have been followed and sample identification and integrity ensured.

Comparability expresses the confidence with which one data set can be compared to another. Data comparability will be maintained using defined procedures and the use of consistent methods and consistent units. Target detection levels are shown in **Table 2** per proposed method and project needs. Actual sample-specific reporting limits will depend on the sample matrix and will be reported for the individual samples.

Accuracy is an assessment of the closeness of the measured value to the true value. Spiking blank soil or reagent water samples with known standards and establishing the average recovery assesses accuracy of chemical test results. For a matrix spike, known amounts of a standard compound identical to the compounds being measured are added to the sample. A quantitative definition of average recovery accuracy is given in Section 4.3. Accuracy measurement will be carried out with a minimum frequency of 1 in 20 samples analyzed.

Precision of the data is a measure of the data spread when more than one measurement has been taken on the same sample. Precision can be expressed as the relative percent difference; a quantitative definition is given in Section 4.3. The level of effort for precision measurements will be a minimum of 1 in 20 samples.

Completeness is a measure of the amount of valid data obtained from the analytical measurement system and the complete implementation of defined field procedures. The quantitative definition of completeness is given in Section 4.3. The target completeness objective will be 90 percent; the actual completeness may vary depending on the intrinsic nature of the samples. The completeness of the data will be assessed during QC reviews.

1.5 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

As described in Section 7.4 of the accompanying Revised FSP, all project staff working on the site must be health and safety trained and must follow requirements specified in the site-specific HASP (Earth Tech, 2005a). The HASP describes the specialized training required for personnel on this project and the documentation and tracking of this training.

1.6 DOCUMENTATION AND RECORDS

Field documentation and records will be as described in Section 2.0. Laboratory documentation will be in accordance with (1) methods and QA protocols listed in Section 2.0, and (2) laboratory-specific standard operating procedures.

2.0 MEASUREMENT DATA ACQUISITION

2.1 SAMPLING PROCESS DESIGN

A supplemental subsurface investigation is needed to obtain additional information on the nature and extent of contamination to complete the soil FS, and to complete risk assessments for on- and off-Property areas.

EPA has determined that characterization data gaps exist and that additional soil sampling is necessary at the Montrose Site to complete the FS for soil and the human health risk assessment. EPA has also determined the need to evaluate the impact of soils as continuing sources of contamination to groundwater. Data obtained from this soil sampling effort is intended to support evaluations of the presence, distribution, and concentrations of chemicals; will allow for completion of the risk assessment; will provide for greater certainty in the FS regarding estimation of volumes requiring remediation; and will assist in evaluating the appropriateness and feasibility of remedial options. While the soil sampling effort intends to fill these data gaps, additional sampling may be needed in the future to finalize the remedy selection process.

Analyte- and area-specific data gaps are summarized below:

- **On- and Near-Property Pesticides** - DDT and benzene hexachloride (BHC)
- **On- and Near-Property Volatile Organic Compounds** - volatile organic compounds (VOCs) in the reworked soil, shallow native soil, and deeper native soil (e.g., up to 90 feet bgs)
- **On- and Near-Property Metals** - lead, arsenic, and chromium
- **Off-Property Pesticide Data** - LADWP right-of-way, Farmer Brothers property, the business area east of Normandie Avenue, and the Western Waste parcel - DDT and BHC

The rationale for the on- and near-Property boring locations and the off-Property boring locations is summarized in **Tables 3** and **4**. The proposed sample locations (see **Figure 4**), number of samples per location, and proposed laboratory analyses are presented in detail in Section 2.4 and in **Appendix B** of this Revised QAPP, and Section 5.0 of the Revised FSP (Earth Tech, 2005)

2.2 SAMPLING METHODS REQUIREMENTS

Sampling activities include collecting soil using a direct-push rig, hollow-stem auger rig, roto-sonic rig, and/or hand auger. A direct-push drill rig will be used for soil sample collection from shallow soil borings and deep 60-foot borings (if feasible). If the direct-push rig is unable to reach the 60-foot sample depth, then a hollow-stem auger rig will be used to advance and collect samples from the deep borings. Hand-auger sampling will be necessary to collect samples at some of the near- and off-Property locations where rig access is limited. In accordance with the methodology used for the DNAPL reconnaissance program, a roto-sonic drill rig will be used for soil sample collection from the deep 90-foot borings. A detailed explanation of the sampling methodology associated with each proposed drilling method is presented in Section 7.0 of the Revised FSP (Earth Tech, 2005).

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Sample handling procedures, including containers, preservation, holding times, packaging and shipping, are detailed in the accompanying Revised FSP (Earth Tech, 2005). Where applicable, field documents including sample custody seals, chain-of-custody (COC) records, and packing lists will be used. Chain-of-custody procedures will be used to maintain and document sample collection and possession. After sample packaging, a laboratory supplied COC form will be completed, as necessary, for the appropriate samples. The COC will be filled out and distributed per the instructions for sample shipping and documentation in the accompanying Revised FSP (Earth Tech, 2005).

2.3.1 CHAIN-OF-CUSTODY

To document sample possession, COC procedures are followed as described in this section.

2.3.1.1 Definition of Custody

A sample is under custody if one or more of the following criteria are met:

- It is in your possession.
- It is in your view, after being in your possession.
- It was in your possession and then you locked it up to prevent tampering.
- It is in a designated secure area.

2.3.1.2 Field Custody

In collecting samples, only enough material to provide a good representation of the media being sampled will be collected. To the extent possible, the quantity and types of samples and sample locations are determined before the actual fieldwork. As few people as possible should handle samples.

The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly.

The SM determines whether proper custody procedures were followed during the fieldwork and decides if additional samples are required.

2.3.1.3 Transfer of Custody and Shipment

A COC record accompanies samples. When transferring samples, the individuals relinquishing and receiving sign, date, and note the time on the record. This record documents custody transfer from the sampler, often through another person, to the analyst at the laboratory.

Samples are packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate COC record accompanying each shipping container. Shipping containers will be sealed with custody seals for shipment to the laboratory. Courier name(s), and other pertinent information, are entered in the "Received by," section of the COC record. All sample shipments will be picked up by the laboratory courier and delivered to the laboratory that same day. No samples will be shipped by overnight courier or other commercial courier service.

Whenever samples are split with a facility owner or agency, it is noted in the Remarks section of the COC record. The note indicates with whom the samples are being split and is signed by both the sampler and recipient. If the split is refused, this will be noted and signed by both parties. If a representative is unavailable or refuses to sign, this is noted in the Remarks section of the COC record. When appropriate, as in the case where the representative is unavailable, the COC record should contain a statement that the samples were delivered to the designated location at the designated time.

The COC record identifies the contents of the shipment and accompanies all shipments. The original record and yellow copy accompany the shipment to the laboratory; the pink copy is sent to and retained by the SM.

2.3.1.4 Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the packing list sample numbers match those on the COC records. Pertinent information about shipment, pickup, and courier is entered in the Remarks section. The custodian then enters the sample numbers into a bound notebook, which is arranged by project code and station number, or the Laboratory Information Management System (LIMS).

The laboratory custodian uses the sample identification number or assigns a unique laboratory number to each sample, and is responsible for seeing that all samples are transferred to the proper analyst or stored in the appropriate secure area.

The custodian distributes samples to the appropriate analysts. Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian. The data from sample analyses are recorded on the laboratory report form.

When sample analyses and necessary QA checks have been completed in the laboratory, the unused portion of the sample will be disposed properly after a period of 30 to 60 days. All identifying stickers, data sheets, and laboratory records are retained as part of the documentation. Sample containers and remaining samples are disposed in compliance with all federal, state, and local regulatory requirements.

2.3.2 CUSTODY SEALS

When samples are shipped to the laboratory, they must be placed in containers sealed with custody seals. One or more custody seals must be placed on each side of the shipping container (cooler).

2.3.3 FIELD NOTEBOOKS

Typical field information to be entered in the field notebook is included in the accompanying Revised FSP (Earth Tech, 2005). In addition to COC records, a bound field notebook must be maintained by each sampling team leader to provide a daily record of significant events, observations, and measurements during field investigations. All entries should be signed and dated. The notebook should be kept as a permanent record. These notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project.

2.3.4 CORRECTIONS TO DOCUMENTATION

All original data recorded in field notebooks, sample identification tags, COC records, and receipts-for-sample forms will be written with waterproof ink, unless prohibited by weather conditions. None of these

accountable serialized documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on an accountable document assigned to one team, the team leader may make corrections simply by drawing a single line through the error and entering the correct information. The erroneous information should not be obliterated. The person who made the entry should correct any subsequent error discovered on an accountable document. All subsequent corrections must be initialed and dated.

2.4 ANALYTICAL METHODS

Project analytes and methods have been listed in **Table 2**. All samples will be analyzed based on EPA SW846 methodology (EPA, 1986) listed in **Table 2**.

Soil samples for volatiles and metal constituents of concern (except for chromium VI) will be analyzed based on EPA SW 846 Methods 8260B and 6020, respectively. Method analytes as listed in **Tables E** and **C** in **Appendix B**, respectively, will be reported by the laboratory. In addition to these analytes up to 10 tentatively identified compounds (TICs) will be reported for method 8260B. For volatile and metals analyses EPA standard methodology and QC procedures will be implemented. For metals, inductively coupled plasma mass spectrometry (ICP-MS) methodology will be used to achieve the benchmark values and Preliminary Remediation Goal (PRGs) (EPA, 2004a) (**Table 1**) as the other methods do not provide the needed low levels for arsenic. Using one method, ICP-MS, rather than a combination of methods is expected to be more economical. The method's standard operating procedures including calibration and QC procedural details, level of effort (frequency of QC runs), control limits, and corrective action requirements are provided in Section 2.5 and **Tables 7** and **8**, respectively. The laboratories will report non-diluted and diluted results to ensure that the lowest detection is attained for all compounds.

Soil chromium VI analyses will be performed using EPA SW846 Method 7199. The method's standard operating procedures including calibration and QC procedural details, level of effort (frequency of QC runs), control limits, and corrective action requirements are provided in Section 2.5 and **Table 6**.

Soil analyses for pesticides will be performed using EPA SW846 Method 8081A, modified to include the 2,4- isomers listed in **Table 2**. All method analytes, as listed in **Table G** in **Appendix B** will be reported by the laboratory. The method's standard operating procedures including calibration and QC procedural details, level of effort (frequency of QC runs), control limits, and corrective action requirements are provided in Section 2.5 and **Table 5**. The laboratories will report non-diluted and diluted results to ensure that the lowest detection is attained for all compounds.

Analysis of QA/QC water samples (equipment blanks, trip blanks, and field blanks) collected during the project will be performed using EPA SW846 methods 8081A, 8260B, and 6020 as detailed in **Tables 5**, **7**, and **8**, and **Tables D**, **F**, and **H** in **Appendix B**.

Wastewater derived during the sampling under this project will be analyzed using standard waste characterization methods identified in **Table 2**. Additional analyses as identified by the waste facility may be added to the list. As needed for waste characterization, aqueous samples may be prepared using EPA Method 1311, prior to analysis of the leachate by EPA SW 846 methods and QC procedures. Waste analyses will also be consistent with California Title 22 specifications. **Tables A** and **B** in **Appendix B** list the respective analytes that will be reported with their associated reporting limits.

2.4.1 METHODOLOGY FOR TENTATIVELY IDENTIFIED COMPOUNDS (TICs) BY EPA 8260B

A library search shall be executed for non-target sample components for the purpose of tentative identification. Up to 10 organic compounds of greatest apparent concentration shall be tentatively identified.

The following are not to be reported:

- Substances with responses less than 40 percent¹ of the internal standard (as determined by inspection of the peak areas),
- Substances which elute earlier than 30 seconds before the first compound in the target list
- Substances which elute three minutes after the last compound listed in the target list has eluted are not required to be searched,
- Target compounds in other requested analyses

Only after visual comparison of sample spectra with the nearest library searches will the mass spectral interpretation specialist assign a tentative identification. Libraries to be used include the following:

- HP Mass Spectral Library, Revision D.01.00 November 1998;
- NIST98 (NIST/EPA/NIH) NIST Mass Spectral Search Program, Version 1.6,
- Wiley 275 Library, C.00.00.

The following guidelines for making tentative identification will be used:

- Relative intensities of major ions in the reference spectrum (ions greater than 10.0 percent of the most abundant ion) should be present in the sample spectrum.
- Major ions present in reference spectrum should be present in sample spectrum.
- Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of co-eluting compounds.

If, after careful review and in the technical judgment of the mass spectral interpretation specialist, no valid identification can be made, the compound should be reported as follows:

- If the library search produces a match at or above 85%, report that compound.
- If the library search produces more than one compound at or above 85%, report the first compound (highest). In addition, the next best nine matches will be reported in the raw data

¹ Derived from the Functional Guidelines for Low Concentration Organic Data Review. (EPA, 2001a)

package. The laboratory report form (Form I or equivalent) should be annotated to indicate other compounds may match the spectra.

- If the library search produces no matches at or above 85%, the compound should be reported as unknown. The sum of these shall be reported as "interfering matrix" with an approximate concentration.

The concentration of any non-target analytes identified in the sample should be estimated. Per EPA Method 8260B, the same formulae as for calibrated analytes should be used with the following modifications:

- The areas A_x and A_{is} should be from the total ion chromatograms, and the response factor (RF) for the compound should be assumed to be 1.
- The resulting concentration should be reported indicating: (1) that the value is an estimate, and (2) which internal standard was used to determine concentration. Use the nearest internal standard free of interferences.

2.5 QUALITY CONTROL

2.5.1 FIELD QC PROCEDURES

A field QC program will be implemented to help maintain the required level of confidence in the field data and to provide cross-checks on the laboratory performing the analyses. QC requirements related to the sampling process (i.e., design, methods, and handling and custody) are discussed in the previous sections of this document. The following types of field QC samples will be collected:

- Duplicate samples for VOCs, metals and pesticides (10 percent)
- Equipment rinsate samples using Type II reagent water
- Trip blanks for VOCs (daily)
- Field Blanks, if required
- Matrix spike/matrix spike duplicate samples (5 percent)

Field QC procedures and types of QC samples are described in detail in Section 7.8 of the Revised FSP (Earth Tech, 2005).

2.5.2 LABORATORY QC PROCEDURES

Pesticides, VOCs, and, metals analyses will follow the QC procedures, level of effort (frequency of runs), control limits, and corrective action requirements identified in **Tables 5, 7, and 8**. Documentation is described in **Appendix B**. The laboratory-specific accuracy, precision, and reporting limit criteria identified in **Appendix B** meet target criteria listed in Section 1.4. Laboratory-specific criteria for accuracy, precision and reporting limits listed in **Appendix B** meet project goals (Section 1.2) and will be

used for monitoring the data. All method analytes listed in **Appendix B** will be reported by the laboratory, as well as up to 10 TICs for Method 8260B.

Chromium VI calibration and QC criteria are shown in **Table 6**. Documentation is described in **Appendix B**. QA/QC water sample and wastewater analyses will be subject to EPA methodology and criteria as described above and in **Appendix B**.

The laboratories will report non-diluted and diluted results to ensure that the lowest detection is attained for all compounds.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Instrument maintenance logbooks are maintained in laboratories at all times. The logbooks, in general, contain a schedule of maintenance, as well as a complete history of past maintenance, both routine and non-routine.

Preventive maintenance is performed according to the procedures delineated in the manufacturer's instrument manuals, including lubrication, source cleaning, detector cleaning, and the frequency of such maintenance. Chromatographic carrier gas purification traps, injector liners, and injector septa are cleaned or replaced on a regular basis. Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to degrade as evidenced by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the QC criteria.

Instrument downtime is minimized by keeping adequate supplies of all expendable items where expendable means an expected lifetime of less than 1 year. These items include gas tanks, gasoline filters, syringes, septa, gas chromatography (GC) columns and packing, ferrules, printer paper and ribbons, pump oil, jet separators, open-split interfaces, and mass spectroscopy filaments.

For field screening equipment (e.g., photo-ionization detector), preventive maintenance will be carried out in accordance with procedures and schedules outlined in the operation and maintenance handbook of a particular model. To minimize downtime, extra parts will accompany the field equipment, as needed.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

2.7.1 FIELD CALIBRATION PROCEDURES

Field screening equipment requiring calibration, if any (e.g., photo-ionization detector), will be calibrated before the start of work, and at the end of the sampling day. Any instrument "drift" from prior calibration should be recorded in a field notebook. Calibration will be in accordance with procedures and schedules outlined in the operation and maintenance manual of a particular instrument.

Using either the manufacturer's serial number or other means will uniquely identify calibrated equipment. A label with the identification number and the date when the next calibration is due will be physically attached to the equipment. If this is not possible, records traceable to the equipment will be readily

available for reference. In addition, the results of calibrations and records of repairs will be recorded in a logbook.

Scheduled periodic calibration of testing equipment does not relieve field personnel of the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, the device shall be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed or a substitute piece of equipment can be obtained.

Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed recalibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented and the task manager and QA/QC reviewer will be notified.

2.7.2 LABORATORY CALIBRATION PROCEDURES

Laboratory calibration procedures, both initial and continuing calibrations, are specified for each analytical methodology and parameter in **Tables 5, 6, 7, and 8**. The calibration procedures vary slightly for each method or parameter.

2.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Supplies and consumables anticipated for use at the site primarily include sample containers, preservation and/or decontamination fluids, and personal protection equipment. Consumables will be purchased in original packaging and stored in a manner that protects their usability. If long-term storage of consumables is necessary, the consumables will be inspected prior to their use to detect any damage or disintegration of the material.

2.9 DATA ACQUISITION REQUIREMENTS (NONDIRECT MEASUREMENTS)

Previously collected data and other information to be used in the decisions of this task are contained in the final RI Report (EPA, 1998) and subsequent reports.

2.10 DATA MANAGEMENT

All data will undergo two levels of review and validation: (1) at the laboratory, and (2) outside the laboratory as described in Section 4.0.

Data management can be defined as comprising the functions of creating and accessing stored data, enforcing data storage conventions, and regulating data input and output. The stored data will include parameters measured in soils at the site.

For this project, data management will involve the use of a computerized data management system. The system will provide a centralized, secure location for data of known quality that can be shared and used for multiple purposes. The data management system will assist in the information flow for the project by providing a means of cataloging, organizing, archiving, and accessing information.

The data management system will include three main elements:

1. The database: An organized and structured storehouse of data used for multiple purposes. Initially, a spreadsheet program will be used; if justified by project needs, a relational database will be used later.
2. Data management procedures: The steps involved in the data management process.
3. Personnel: The project staff who develop, implement, and administer the database and procedures.

These elements are briefly described in the following subsections.

2.10.1 THE DATABASE

A spreadsheet or database will be created to store data collected as part of this effort. Software to be used in support of the spreadsheet or relational database may be Microsoft Excel or Microsoft Access, respectively.

2.10.2 DATA MANAGEMENT PROCEDURES

Data management procedures are a crucial part of the data management system. Established procedures are necessary to ensure consistency among data sets; internal database integrity; and a verified, usable data set. The tasks and procedures that will be performed for all project data before they are entered include:

- Data mapping. The process by which the collected environmental data are selected, marked, and correctly named for entry into the database.
- Electronic data interchange. To facilitate data interchange between the analytical laboratory and the data user, detailed specifications will be developed for both receipt and delivery of electronic data, including data importing and data exporting.
- Data entry and verification. The process by which data are correctly entered into the database, including data preparation, data import and entry, and data verification.
- Data presentation and analysis. Data from the database may be presented in two types of reports: (1) appendix-style reports (tabular listings sorted by station and sample identification), and (2) summary statistics (e.g., frequency of detection, mean, minimum values, maximum values, standard deviation, and variance) sorted by station, depth, and parameter.
- Data administration. Effective administration of the data management system will reduce the likelihood of errors and ensure the integrity of the database. Data administration tasks include data redundancy control, operation and maintenance of the database, documentation of the data

management process, and closing out the data management task in both interim and final stages of completion.

2.10.3 PERSONNEL

Successful implementation of a data management system requires a clear definition of responsibilities. The project data coordinator and a database technician will carry out the data management system. The project data coordinator has an overall view of the project. Responsibilities includes database integrity, redundancy control, data sharing and version control, performance, security, and backup. The database technician has a comprehensive understanding of the database structure, software, and associated analysis tools. Responsibilities include data logging and tracking, data preparation, data entry and verification, data archiving, data requests, and report generation.

3.0 ASSESSMENT/OVERSIGHT

3.1 ASSESSMENT AND RESPONSE ACTIONS

The SM, QAO, and review team will monitor and audit the performance of the QA procedures.

The QAO will conduct at a minimum, one comprehensive field audit at the beginning of the sampling program. If problems arise, additional field audits may be scheduled. The audit will evaluate (1) the execution of sample identification, COC procedures, field notebooks, sampling procedures, and field measurements; (2) whether trained personnel staffed the sample event; (3) whether equipment was in proper working order; (4) availability of proper sampling equipment; (5) whether appropriate sample containers, sample preservatives, and techniques were used; (6) whether sample packaging and shipment were appropriate; and (7) whether QC samples were properly collected.

The laboratories may be audited, prior to the start of analyses, by a project chemist/QAO not assigned to the laboratory. Del Mar Analytical in Irvine, California has been selected as the analytical laboratory for the soil sampling program. This analytical laboratory has previously been contracted for groundwater work associated with the site and has previously been audited by Hargis + Associates in advance of that work. Throughout the duration of this project, EPA may submit, at its discretion, performance evaluation samples along with the routine project samples to monitor laboratory performance. A paper audit has been scheduled prior to using the laboratory.

Audits, if necessary, will be followed up with an audit report prepared by the reviewer. The auditor will also debrief the laboratory or the field team at the end of the audit and request that the laboratory or field team comply with the corrective action request, if any.

3.1.1 REPORTING AND RESOLUTION OF ISSUES

If QA/QC audits result in detection of unacceptable conditions or data, the SM will be responsible for developing and initiating corrective action. The EPA RPM will be notified if nonconformance is of program significance or requires special expertise not normally available to the project team. Corrective action may include:

- Reanalyzing samples if holding time criteria permits
- Resampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting data acknowledging a level of uncertainty

3.2 REPORTS TO MANAGEMENT

The SM may request that a QA report be prepared for the RPM on the performance of sample collection and data quality. The report will include:

- Assessment of measurement data quality

- Results of performance audits
- Results of systems audits
- Significant QA problems and recommended solutions

QA reports generated on sample collection and data quality will focus on specific problems encountered and solutions implemented. The project objectives, activities performed for overall results, sampling, and field measurement data quality information will be summarized and included in the final report along with all QA reports.

4.0 DATA VALIDATION AND USABILITY

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

Data for all parameters will undergo two levels of review and validation: (1) at the laboratory, and (2) outside the laboratory by the QAO or their designee. A minimum of 10 percent of the data will undergo validation of full raw data packages, i.e., EPA Region 9 Tier 3 (EPA, 2001b), and the remaining 90 percent will be validated per EPA Region 9 Tier 2 (EPA, 2001b), as described in Section 4.2.1.

4.2 VALIDATION AND VERIFICATION METHODS

Initial data reduction, validation, and reporting at the laboratory will be carried out as described in the laboratory standard operating procedures.

Independent data validation outside the laboratory will follow EPA National Functional Guidelines for Data Review (EPA, 1994a,b; revised 1999 and 2002, respectively) as applicable to SW 846 methods used for the project.

4.2.1 VERIFICATION AND VALIDATION OF LABORATORY DATA

Earth Tech will verify all project laboratory data packages. Verification will consist of reviewing data packages for completeness and compliance with respect to the methods, requirements, and objectives stated in this Revised QAPP. Verification will be performed by the Earth Tech QAO or their designee, and will be documented in permanent worksheets to be maintained in the project files and summarized in the Quality Assurance Summary Reports (QASRs).

Earth Tech will validate the project laboratory data in accordance with the QA requirements and control limits specified in this Revised QAPP, and the following USEPA guidance, as appropriate:

- USEPA *National Functional Guidelines for Organic Data Review*, EPA/540/R-99/008 (October 1999)
- USEPA *National Functional Guidelines for Inorganic Data Review*, EPA/540/R-01/008 (July 2002)

The reviewer's professional judgment will be used to evaluate data quality when called for in the Functional Guidelines.

Tier 3 Data Validation

Earth Tech will request that the project analytical laboratory provide all reports as full raw data packages. Earth Tech will select a minimum of 10 percent of the samples using a random selection process over the time period of sample collection, and review and validate the full raw data packages for these selected samples per Tier 3 (as defined by EPA guidance [EPA, 2001b]). Critical samples or other samples determined to be of decision-making significance will be included in the 10 percent. In advance of conducting the Tier 3 data validations, Earth Tech will provide EPA with the list of the selected samples for review and approval. Validation of raw data

packages will consist of review of all summary forms, as well as review of raw data for acceptable calibration criteria and frequency, spot checks of calculations, use of proper procedures as documented in the laboratory notebooks, etc. Data validation will include checking that required QC samples (e.g., method blanks, laboratory control samples [LCS], matrix spikes/matrix spike duplicates [MS/MSD]) have been performed at the required frequency and the QC acceptance criteria have been met. Surrogate spikes will be checked to verify that they were performed where required and that recovery acceptance criteria have been met. Initial and continuing calibration data will be reviewed for completeness and conformance to acceptance criteria. Quantitation limits will be verified. Sample data will be checked to confirm that sample preparation and analysis were performed within holding times, and that second chromatographic column or mass spectrometer confirmation was performed where required. All laboratory blanks and field blanks will be checked for blank contamination.

Tier 2 Data Validation

Approximately 90 percent of the data will be validated based on summary QC data (including all QC data). This review/validation is designated as EPA Region 9 Tier 2. QC data to be reviewed for Tier 2 will include calibrations (initial and continuing), holding times, LCS, MS/MSD, surrogate recovery, blank contamination, tuning, internal standards areas/retention times, interference checks, and second column confirmation. If findings from the Tier 2 review indicate problems, EPA may require additional data to be reviewed per Tier 3.

Results from field duplicates will be compared and relative percent difference (RPD) values will be calculated, where possible. Data are evaluated but no qualifiers will be assigned based on duplicate results. Blank evaluation will be based on contamination in both laboratory blanks and field blanks. Sample results less than five times the maximum level found in the associated blanks (or less than 10 times for common laboratory contaminants) will be qualified according to the blank qualification rules.

All deviations listed in the functional guidelines will be flagged as applicable to SW846 methods, what are used for the project.

4.3 RECONCILIATION WITH DATA QUALITY OBJECTIVES

Results obtained from the project will be reconciled with the requirements specified in **Table 2**. Assessment of data for precision, accuracy, and completeness will be per the following quantitative definitions.

Precision

If calculated from duplicate measurements:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2) / 2}$$

RPD = relative percent difference

C₁ = larger of the two observed values

C_2 = smaller of the two observed values

If calculated from three or more replicates, use relative standard deviation (RSD) rather than RPD:

$$RSD = (s / \bar{y}) \times 100\%$$

RSD = relative standard deviation

s = standard deviation

\bar{y} = mean of replicate analyses

Standard deviation, s, is defined as follows:

$$S = \sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n - 1}}$$

s = standard deviation

y_i = measured value of the i^{th} replicate

\bar{y} = mean of replicate analyses

n = number of replicates

Accuracy

For measurements where matrix spikes are used:

$$\%R = 100\% \times \left[\frac{S - U}{C_{sa}} \right]$$

%R = percent recovery

S = measured concentration in spiked aliquot

U = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

For situations where a standard reference material (SRM) is used instead of or in addition to matrix spikes:

$$\%R = 100\% \times \left[\frac{C_m}{C_{sm}} \right]$$

%R = percent recovery

C_m = measured concentration of SRM

C_{sm} = actual concentration of SRM

Completeness (Statistical)

Defined as follows for all measurements:

$$\%C = 100\% \times \left[\frac{V}{T} \right]$$

%C = percent completeness

V = number of measurements judged valid

T = total number of measurements

5.0 REFERENCES

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TABLES

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
Soil Analyses¹				
Pesticides				
Aldrin	↓ Supplement RI data for risk assessment and FS tasks	↓ Remedial engineers/scientists, regulators	0.1 mg/kg	0.005 mg/kg
alpha -BHC			0.36 mg/kg ^c	0.005 mg/kg
beta-BHC			1.3 mg/kg	0.005 mg/kg
delta-BHC			NA/ 0.36 ^d	0.005 mg/kg
gamma-BHC			1.7 mg/kg	0.005 mg/kg
Chlordane			6.5 mg/kg	0.05 mg/kg
2,4'-DDT			7 mg/kg ^c /10 mg/kg ^c (this regulatory detection limit applies to the sum of six DDT, DDD, and DDE isomers)	0.005 mg/kg
2,4'-DDD				0.005 mg/kg
2,4'-DDE				0.005 mg/kg
4,4'-DDT				0.005 mg/kg
4,4'-DDD				0.005 mg/kg
4,4'-DDE				0.005 mg/kg
Dieldrin			0.11 mg/kg	0.005 mg/kg
Endosulfan I			3,700 mg/kg (tot)	0.005 mg/kg
Endosulfan II			3,700 mg/kg (tot)	0.005 mg/kg
Endosulfan sulfate			NA	0.01 mg/kg
Endrin			180 mg/kg	0.005 mg/kg
Endrin aldehyde			NA	0.005 mg/kg
Endrin ketone			NA	0.005 mg/kg
Heptachlor			0.38 mg/kg	0.005 mg/kg
Heptachlor epoxide	0.19 mg/kg	0.005 mg/kg		
Methoxychlor	3,100 mg/kg	0.005 mg/kg		
Toxaphene	1.6 mg/kg	0.2 mg/kg		
Volatiles				
Acetone	↓	↓	54,000 mg/kg	0.01 mg/kg
Benzene			1.4 mg/kg	0.002 mg/kg
Bromobenzene			92 mg/kg	0.005 mg/kg
Bromochloromethane			NA	0.005 mg/kg
Bromodichloromethane			1.8 mg/kg	0.002 mg/kg
Bromoform			220 mg/kg	0.005 mg/kg
Bromomethane			13 mg/kg	0.005 mg/kg
2-Butanone (MEK)			110,000 mg/kg	0.01 mg/kg
n-Butylbenzene			240 mg/kg	0.005 mg/kg
sec-Butylbenzene			220 mg/kg	0.005 mg/kg
tert-Butylbenzene			390 mg/kg	0.005 mg/kg
Carbon disulfide			720 mg/kg	0.005 mg/kg
Carbon Tetrachloride			0.55 mg/kg	0.005 mg/kg
Chlorobenzene			530 mg/kg	0.002 mg/kg
Chloroethane			6.5 mg/kg	0.005 mg/kg

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
Chloroform	↓	↓	2.0 mg/kg ^f	0.002 mg/kg
Chloromethane			160 mg/kg	0.005 mg/kg
2-Chlorotoluene			560 mg/kg	0.005 mg/kg
4-Chlorotoluene			NA	0.005 mg/kg
Dibromochloromethane			2.6 mg/kg	0.002 mg/kg
1,2-Dibromo-3-chloropropane (DBCP)			0.076 mg/kg ^f	0.005 mg/kg
1,2-Dibromoethane (EDB)			0.073 mg/kg	0.002 mg/kg
Dibromomethane			NA	0.002 mg/kg
1,2-Dichlorobenzene			600 mg/kg	0.002 mg/kg
1,3-Dichlorobenzene			600 mg/kg	0.002 mg/kg
1,4-Dichlorobenzene			7.9 mg/kg	0.002 mg/kg
Dichlorodifluoromethane			310 mg/kg	0.005 mg/kg
1,1-Dichloroethane			6.0 mg/kg ^f	0.002 mg/kg
1,2-Dichloroethane			0.6 mg/kg	0.002 mg/kg
1,1-Dichloroethene			410 mg/kg	0.005 mg/kg
cis-1,2-Dichloroethene			150 mg/kg	0.002 mg/kg
trans-1,2-Dichloroethene			230 mg/kg	0.002 mg/kg
1,2-Dichloropropane			0.74 mg/kg	0.002 mg/kg
1,3-Dichloropropane			360 mg/kg	0.002 mg/kg
2,2-Dichloropropane			NA	0.002 mg/kg
1,1-Dichloropropene			NA	0.002 mg/kg
cis-1,3-Dichloropropene			1.8 mg/kg (tot)	0.002 mg/kg
trans-1,3-Dichloropropene			1.8 mg/kg (tot)	0.002 mg/kg
Ethylbenzene			400 mg/kg	0.002 mg/kg
Hexachlorobutadiene			22 mg/kg	0.005 mg/kg
2-Hexanone (MBK)			NA	0.01 mg/kg
Isopropylbenzene			2,000 mg/kg	0.002 mg/kg
p-Isopropyltoluene			NA	0.002 mg/kg
Methylene chloride			21 mg/kg	0.02 mg/kg
4-Methyl-2-Pentanone (MIBK)			47,000 mg/kg	0.005 mg/kg
Methyl-tert Butyl Ether (MTBE)			36 mg/kg	0.002 mg/kg
Napthalene			4.2 mg/kg ^f	0.005 mg/kg
n-Propylbenzene			240 mg/kg	0.002 mg/kg
Styrene			1,700 mg/kg	0.002 mg/kg
1,1,1,2-Tetrachloroethane			7.3 mg/kg	0.005 mg/kg
1,1,2,2-Tetrachloroethane			0.93 mg/kg	0.002 mg/kg
Tetrachloroethene			1.3 mg/kg	0.002 mg/kg
Toluene			520 mg/kg	0.002 mg/kg
1,2,3-trichlorobenzene			NA	0.005 mg/kg

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b		
1,2,4-trichlorobenzene	↓	↓	220 mg/kg	0.005 mg/kg		
1,1,1-trichloroethane			1,200 mg/kg	0.002 mg/kg		
1,1,2-trichloroethane			1.6 mg/kg	0.002 mg/kg		
Trichloroethylene (TCE)			6.5 mg/kg ^f	0.002 mg/kg		
Trichlorofluoromethane			2,000 mg/kg	0.005 mg/kg		
1,2,3-Trichloropropane			0.076 mg/kg	0.01 mg/kg		
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)			5,600 mg/kg	0.005 mg/kg		
1,2,4-Trimethylbenzene			170 mg/kg	0.002 mg/kg		
1,3,5-Trimethylbenzene			70 mg/kg	0.002 mg/kg		
Vinyl Chloride			0.75 mg/kg	0.005 mg/kg		
o-Xylene			420 mg/kg	0.002 mg/kg		
m,p-Xylene			420 mg/kg	0.002 mg/kg		
Metals						
Antimony			↓	↓	410 mg/kg	1.0 mg/kg
Arsenic	1.6 mg/kg ^c / 10 mg/kg ^c	0.50 mg/kg				
Barium	67,000 mg/kg	0.50 mg/kg				
Beryllium	1,900 mg/kg	0.30 mg/kg				
Cadmium	450 mg/kg	0.50 mg/kg				
Chromium	10,000 mg/kg ^g	1.0 mg/kg				
Chromium VI	64 mg/kg	0.20 mg/kg				
Cobalt	1,900 mg/kg	0.50 mg/kg				
Copper	41,000 mg/kg	1.0 mg/kg				
Lead	800 mg/kg	0.50 mg/kg				
Molybdenum	5,100 mg/kg	0.50 mg/kg				
Nickel	2,000 mg/kg	0.50 mg/kg				
Selenium	5,100 mg/kg	1.0 mg/kg				
Silver	5,100 mg/kg	0.50 mg/kg				
Thallium	67 mg/kg	0.50 mg/kg				
Vanadium	1,000 mg/kg	0.50 mg/kg				
Zinc	100,000 mg/kg	10 mg/kg				

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
Aqueous Analyses (QA/QC Samples)				
Pesticides				
Aldrin	Evaluation of contamination resulting from field activities ↓	Scientists, regulators, validators ↓	Not Applicable ^e	Laboratory MDL ^e
alpha-BHC			Not Applicable ^e	Laboratory MDL ^e
beta-BHC				
delta-BHC				
gamma-BHC				
Chlorodane			Not Applicable ^e	Laboratory MDL ^e
2,4'-DDD			Not Applicable ^e	Laboratory MDL ^e
2,4'-DDE				
2,4'-DDT			Not Applicable ^e	Laboratory MDL ^e
4,4'-DDD				
4,4'-DDE			Not Applicable ^e	Laboratory MDL ^e
4,4'-DDT				
Dieldrin			Not Applicable ^e	Laboratory MDL ^e
Endosulfan I			Not Applicable ^e	Laboratory MDL ^e
Endosulfan II			Not Applicable ^e	Laboratory MDL ^e
Endosulfan sulfate			Not Applicable ^e	Laboratory MDL ^e
Endrin			Not Applicable ^e	Laboratory MDL ^e
Endrin aldehyde			Not Applicable ^e	Laboratory MDL ^e
Endrin ketone			Not Applicable ^e	Laboratory MDL ^e
Heptachlor			Not Applicable ^e	Laboratory MDL ^e
Heptachlor epoxide	Not Applicable ^e	Laboratory MDL ^e		
Methoxychlor	Not Applicable ^e	Laboratory MDL ^e		
Toxaphene	Not Applicable ^e	Laboratory MDL ^e		
Volatiles				
Acetone	↓	↓	Not Applicable ^e	Laboratory MDL ^e
Benzene			Not Applicable ^e	Laboratory MDL ^e
Bromobenzene			Not Applicable ^e	Laboratory MDL ^e
Bromochloromethane			Not Applicable ^e	Laboratory MDL ^e
Bromodichloromethane			Not Applicable ^e	Laboratory MDL ^e
Bromoform			Not Applicable ^e	Laboratory MDL ^e
Bromomethane			Not Applicable ^e	Laboratory MDL ^e
2-Butanone (MEK)			Not Applicable ^e	Laboratory MDL ^e
n-Butylbenzene			Not Applicable ^e	Laboratory MDL ^e
sec-Butylbenzene			Not Applicable ^e	Laboratory MDL ^e
tert-Butylbenzene			Not Applicable ^e	Laboratory MDL ^e
Carbon disulfide			Not Applicable ^e	Laboratory MDL ^e
Carbon Tetrachloride			Not Applicable ^e	Laboratory MDL ^e
Chlorobenzene			Not Applicable ^e	Laboratory MDL ^e
Chloroethane			Not Applicable ^e	Laboratory MDL ^e

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
Chloroform	↓	↓	Not Applicable ^e	Laboratory MDL ^e
Chloromethane			Not Applicable ^e	Laboratory MDL ^e
2-Chlorotoluene			Not Applicable ^e	Laboratory MDL ^e
4-Chlorotoluene			Not Applicable ^e	Laboratory MDL ^e
Dibromochloromethane			Not Applicable ^e	Laboratory MDL ^e
1,2-Dibromo-3-chloropropane			Not Applicable ^e	Laboratory MDL ^e
1,2-Dibromoethane (EDB)			Not Applicable ^e	Laboratory MDL ^e
Dibromomethane			Not Applicable ^e	Laboratory MDL ^e
1,2-dichlorobenzene			Not Applicable ^e	Laboratory MDL ^e
1,3-dichlorobenzene			Not Applicable ^e	Laboratory MDL ^e
1,4-dichlorobenzene			Not Applicable ^e	Laboratory MDL ^e
Dichlorodifluoromethane			Not Applicable ^e	Laboratory MDL ^e
1,1-dichloroethane			Not Applicable ^e	Laboratory MDL ^e
1,2-dichloroethane			Not Applicable ^e	Laboratory MDL ^e
1,1-dichloroethene			Not Applicable ^e	Laboratory MDL ^e
Cis-1,2-dichloroethene			Not Applicable ^e	Laboratory MDL ^e
Trans-1,2-dichloroethene			Not Applicable ^e	Laboratory MDL ^e
1,2-Dichloropropane			Not Applicable ^e	Laboratory MDL ^e
1,3-Dichloropropane			Not Applicable ^e	Laboratory MDL ^e
2,2-Dichloropropane			Not Applicable ^e	Laboratory MDL ^e
1,1-Dichloropropene			Not Applicable ^e	Laboratory MDL ^e
Cis-1,3-Dichloropropene			Not Applicable ^e	Laboratory MDL ^e
Trans-1,3-Dichloropropene			Not Applicable ^e	Laboratory MDL ^e
Ethylbenzene			Not Applicable ^e	Laboratory MDL ^e
Hexachlorobutadiene			Not Applicable ^e	Laboratory MDL ^e
2-Hexanone			Not Applicable ^e	Laboratory MDL ^e
Isopropylbenzene			Not Applicable ^e	Laboratory MDL ^e
p-Isopropyltoluene			Not Applicable ^e	Laboratory MDL ^e
Methylene chloride			Not Applicable ^e	Laboratory MDL ^e
4-Methyl-2-Pentanone (MIBK)			Not Applicable ^e	Laboratory MDL ^e
Methyl-tert Butyl Ether (MTBE)	Not Applicable ^e	Laboratory MDL ^e		
Napthalene	Not Applicable ^e	Laboratory MDL ^e		
n-Propylbenzene	Not Applicable ^e	Laboratory MDL ^e		
Styrene	Not Applicable ^e	Laboratory MDL ^e		
1,1,1,2-Tetrachloroethane	Not Applicable ^e	Laboratory MDL ^e		
1,1,2,2-Tetrachloroethane	Not Applicable ^e	Laboratory MDL ^e		
Tetrachloroethene	Not Applicable ^e	Laboratory MDL ^e		
Toluene	Not Applicable ^e	Laboratory MDL ^e		
1,2,3-Trichlorobenzene	Not Applicable ^e	Laboratory MDL ^e		

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
1,2,4-Trichlorobenzene	↓	↓	Not Applicable ^e	Laboratory MDL ^e
1,1,1-Trichloroethane			Not Applicable ^e	Laboratory MDL ^e
1,1,2-Trichloroethane			Not Applicable ^e	Laboratory MDL ^e
Trichloroethene			Not Applicable ^e	Laboratory MDL ^e
Trichlorofluoromethane			Not Applicable ^e	Laboratory MDL ^e
1,2,3-Trichloropropane			Not Applicable ^e	Laboratory MDL ^e
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)			Not Applicable ^e	Laboratory MDL ^e
1,2,4-Trimethylbenzene			Not Applicable ^e	Laboratory MDL ^e
1,3,5-Trimethylbenzene			Not Applicable ^e	Laboratory MDL ^e
Vinyl Chloride			Not Applicable ^e	Laboratory MDL ^e
o-Xylene			Not Applicable ^e	Laboratory MDL ^e
m,p-Xylene			Not Applicable ^e	Laboratory MDL ^e
Metals				
Antimony	↓	↓	Not Applicable ^e	Laboratory MDL ^e
Arsenic			Not Applicable ^e	Laboratory MDL ^e
Barium			Not Applicable ^e	Laboratory MDL ^e
Beryllium			Not Applicable ^e	Laboratory MDL ^e
Cadmium			Not Applicable ^e	Laboratory MDL ^e
Chromium			Not Applicable ^e	Laboratory MDL ^e
Cobalt			Not Applicable ^e	Laboratory MDL ^e
Copper			Not Applicable ^e	Laboratory MDL ^e
Lead			Not Applicable ^e	Laboratory MDL ^e
Molybdenum			Not Applicable ^e	Laboratory MDL ^e
Nickel			Not Applicable ^e	Laboratory MDL ^e
Selenium			Not Applicable ^e	Laboratory MDL ^e
Silver			Not Applicable ^e	Laboratory MDL ^e
Thallium			Not Applicable ^e	Laboratory MDL ^e
Vanadium			Not Applicable ^e	Laboratory MDL ^e
Zinc			Not Applicable ^e	Laboratory MDL ^e

TABLE 1
Data Needs and Uses
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter to be Analyzed	Uses/Decisions	Users	Applicable Regulatory Detection Limits ^{a,c}	Target Detection Limits ^b
Investigation-Derived Wastewater Analyses ^h				
Volatiles	Waste characterization	Field Team and Disposal facility operators	TCLP and STLC levels (Appendix B, Tables 1 & 2)	TCLP or STLC levels, the lower of the two
Pesticides/PCBs				
Metals				

Notes:

^a Regulatory detection levels for waste characterization (investigation-derived wastewater) are as presented in the Toxicity Characteristics Leaching Procedure (TCLP) list (Table A in Appendix B); and California Soluble Threshold Limit Concentration (STLC) list (Table B in Appendix B).

^b These limits are below regulatory limits. Standard method 8081A addresses 4,4/para isomers; for the other isomers equivalent detection levels can be achieved.

^c EPA Region IX 2004 Industrial Preliminary Remediation Goals (PRGs) for soil (revised October 2004); the 10 parts per million (ppm) level for both total DDT and arsenic are the benchmark values currently being implemented at this and other sites in the area. PRGs are defined for DDT without differentiation between the different isomers.

^d NA-Not available, the lowest industrial PRG for the other isomers is used as a guideline.

^e Not Applicable due to QA/QC samples. Otherwise, State Maximum Contaminant Levels (MCLs) would apply. Laboratory method detection limits (MDLs) apply.

^f California-modified industrial PRG.

^g Analyze for hexavalent chromium if the total chromium result is above the industrial PRG for hexavalent chromium (64 mg/kg).

^h Additional analysis may be required as identified by the waste facility

ⁱ EPA and Montrose have not yet determined an appropriate approach for analysis of chloral hydrate. Decisions regarding the approach for analysis of chloral hydrate will be documented separately, if not resolved in a time frame allowing the method to be incorporated into the Revised QAPP, and may require an amendment to the Revised QAPP.

mg/L – milligrams per liter

mg/kg – milligrams per kilogram

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Soil					
Pesticides					
Aldrin	8081A	0.005 mg/kg	34-132	± 43	90
alpha -BHC	8081A	0.005 mg/kg			
beta-BHC	8081A	0.005 mg/kg			
delta-BHC	8081A	0.005 mg/kg			
gamma-BHC	8081A	0.005 mg/kg	46-127	± 50	90
Chlordane	8081A	0.05 mg/kg			
2,4'-DDD	8081A	0.005 mg/kg			
2,4'-DDE	8081A	0.005 mg/kg			
2,4'-DDT	8081A	0.005 mg/kg			
4,4'-DDD	8081A	0.005 mg/kg			
4,4'-DDE	8081A	0.005 mg/kg			
4,4'-DDT	8081A	0.005 mg/kg	23-134	± 50	90
Dieldrin	8081A	0.005 mg/kg	31-134	± 38	90
Endosulfan I	8081A	0.005 mg/kg			
Endosulfan II	8081A	0.005 mg/kg			
Endosulfan sulfate	8081A	0.01 mg/kg			
Endrin	8081A	0.005 mg/kg	42-139	± 45	90
Endrin aldehyde	8081A	0.005 mg/kg			
Endrin ketone	8081A	0.005 mg/kg			
Heptachlor	8081A	0.005 mg/kg	35-130	± 31	90
Heptachlor epoxide	8081A	0.005 mg/kg			
Methoxychlor	8081A	0.005 mg/kg			
Toxaphene	8081A	0.2 mg/kg			
Volatiles					
Acetone	8260B	0.010 mg/kg			
Benzene	8260B	0.002 mg/kg	66-142	± 21	90
Bromobenzene	8260B	0.005 mg/kg			
Bromochloromethane	8260B	0.005 mg/kg			
Bromodichloromethane	8260B	0.002 mg/kg			
Bromoform	8260B	0.005 mg/kg			
Bromomethane	8260B	0.005 mg/kg			
2-Butanone (MEK)	8260B	0.01 mg/kg			
n-Butylbenzene	8260B	0.005 mg/kg			
sec-Butylbenzene	8260B	0.005 mg/kg			
tert-Butylbenzene	8260B	0.005 mg/kg			
Carbon disulfide	8260B	0.005 mg/kg			

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Carbon Tetrachloride	8260B	0.005 mg/kg			
Chlorobenzene	8260B	0.002 mg/kg	60-133	± 21	90
Chloroethane	8260B	0.005 mg/kg			
Chloroform	8260B	0.002 mg/kg			
Chloromethane	8260B	0.005 mg/kg			
2-Chlorotoluene	8260B	0.005 mg/kg			
4-Chlorotoluene	8260B	0.005 mg/kg			
Dibromochloromethane	8260B	0.002 mg/kg			
1,2-Dibromo-3-chloropropane	8260B	0.005 mg/kg			
1,2-Dibromoethane (EDB)	8260B	0.002 mg/kg			
Dibromomethane	8260B	0.002 mg/kg			
1,2-dichlorobenzene	8260B	0.002 mg/kg			
1,3-dichlorobenzene	8260B	0.002 mg/kg			
1,4-dichlorobenzene	8260B	0.002 mg/kg			
Dichlorodifluoromethane	8260B	0.005 mg/kg			
1,1-dichloroethane	8260B	0.002 mg/kg			
1,2-dichloroethane	8260B	0.002 mg/kg			
1,1-dichloroethene	8260B	0.005 mg/kg	59-172	± 22	90
Cis-1,2-dichloroethene	8260B	0.002 mg/kg			
Trans-1,2-dichloroethene	8260B	0.002 mg/kg			
1,2-Dichloropropane	8260B	0.002 mg/kg			
1,3-Dichloropropane	8260B	0.002 mg/kg			
2,2-Dichloropropane	8260B	0.002 mg/kg			
1,1-Dichloropropene	8260B	0.002 mg/kg			
Cis-1,3-Dichloropropene	8260B	0.002 mg/kg			
Trans-1,3-Dichloropropene	8260B	0.002 mg/kg			
Ethylbenzene	8260B	0.002 mg/kg			
Hexachlorobutadiene	8260B	0.005 mg/kg			
2-Hexanone	8260B	0.010 mg/kg			
Isopropylbenzene	8260B	0.002 mg/kg			
p-Isopropyltoluene	8260B	0.002 mg/kg			
Methylene chloride	8260B	0.002 mg/kg			
4-Methyl-2-Pentanone (MIBK)	8260B	0.005 mg/kg			
Methyl-tert Butyl Ether (MTBE)	8260B	0.002 mg/kg			
Napthalene	8260B	0.005 mg/kg			
n-Propylbenzene	8260B	0.002 mg/kg			

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Styrene	8260B	0.002 mg/kg			
1,1,1,2-Tetrachloroethane	8260B	0.005 mg/kg			
1,1,2,2-tetrachloroethane	8260B	0.002 mg/kg			
Tetrachloroethene	8260B	0.002 mg/kg			
Toluene	8260B	0.002 mg/kg	59-139	± 21	90
1,2,3-trichlorobenzene	8260B	0.005 mg/kg			
1,2,4-trichlorobenzene	8260B	0.005 mg/kg			
1,1,1-trichloroethane	8260B	0.002 mg/kg			
1,1,2-trichloroethane	8260B	0.002 mg/kg			
Trichloroethene	8260B	0.002 mg/kg	62-137	± 24	90
Trichlorofluoromethane	8260B	0.005 mg/kg			
1,2,3-Trichloropropane	8260B	0.010 mg/kg			
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8260B	0.005 mg/kg			
1,2,4-Trimethylbenzene	8260B	0.002 mg/kg			
1,3,5-Trimethylbenzene	8260B	0.002 mg/kg			
Vinyl Chloride	8260B	0.005 mg/kg			
o-Xylene	8260B	0.002 mg/kg			
m,p-Xylene	8260B	0.002 mg/kg			
Metals					
Antimony	6020 (ICP/MS)	1.0 mg/kg	80-120	± 20	90
Arsenic	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Barium	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Beryllium	6020 (ICP/MS)	0.30 mg/kg	80-120	± 20	90
Cadmium	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Chromium	6020 (ICP/MS)	1.0 mg/kg	80-120	± 20	90
Chromium VI	7199	0.20 mg/kg	70-140	± 40	90
Cobalt	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Copper	6020 (ICP/MS)	1.0 mg/kg	80-120	± 20	90
Lead	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Molybdenum	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Nickel	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Selenium	6020 (ICP/MS)	1.0 mg/kg	80-120	± 20	90
Silver	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Thallium	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Vanadium	6020 (ICP/MS)	0.50 mg/kg	80-120	± 20	90
Zinc	6020 (ICP/MS)	10 mg/kg	80-120	± 20	90

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Aqueous (QA/QC samples)					
Pesticides					
Aldrin	8081A	0.0040 µg/L	40-120	± 22	90
alpha -BHC	8081A	0.0050 µg/L			
beta-BHC	8081A	0.010 µg/L			
delta-BHC	8081A	0.0050 µg/L			
gamma-BHC	8081A	0.010 µg/L	56-123	± 15	90
Chlordane	8081A	0.10 µg/L			
2,4'-DDD	8081A	0.10 µg/L			
2,4'-DDE	8081A	0.10 µg/L			
2,4'-DDT	8081A	0.10 µg/L			
4,4'-DDD	8081A	0.0050 µg/L			
4,4'-DDE	8081A	0.0050 µg/L	50-150	± 30	90
4,4'-DDT	8081A	0.010 µg/L	38-127	± 27	90
Dieldrin	8081A	0.0050 µg/L	52-126	± 18	90
Endosulfan I	8081A	0.0050 µg/L			
Endosulfan II	8081A	0.0050 µg/L			
Endosulfan sulfate	8081A	0.010 µg/L			
Endrin	8081A	0.0050 µg/L	56-121	± 21	90
Endrin aldehyde	8081A	0.010 µg/L			
Endrin ketone	8081A	0.010 µg/L			
Heptachlor	8081A	0.010 µg/L	40-131	± 20	90
Heptachlor epoxide	8081A	0.0050 µg/L			
Methoxychlor	8081A	0.0050 µg/L			
Toxaphene	8081A	5.0 µg/L			
Volatiles					
Acetone	8260B	10 µg/L			
Benzene	8260B	2.0 µg/L	66-142	± 11	90
Bromobenzene	8260B	5.0 µg/L			
Bromochloromethane	8260B	5.0 µg/L			
Bromodichloromethane	8260B	2.0 µg/L			
Bromoform	8260B	5.0 µg/L			
Bromomethane	8260B	5.0 µg/L			
2-Butanone (MEK)	8260B	10 µg/L			
n-Butylbenzene	8260B	5.0 µg/L			
sec-Butylbenzene	8260B	5.0 µg/L			
tert-Butylbenzene	8260B	5.0 µg/L			

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Carbon disulfide	8260B	5.0 µg/L			
Carbon Tetrachloride	8260B	5.0 µg/L			
Chlorobenzene	8260B	2.0 µg/L	60-133	± 13	90
Chloroethane	8260B	5.0 µg/L			
Chloroform	8260B	2.0 µg/L			
Chloromethane	8260B	5.0 µg/L			
2-Chlorotoluene	8260B	5.0 µg/L			
4-Chlorotoluene	8260B	5.0 µg/L			
Dibromochloromethane	8260B	2.0 µg/L			
1,2-Dibromo-3-chloropropane	8260B	5.0 µg/L			
1,2-Dibromoethane (EDB)	8260B	2.0 µg/L			
Dibromomethane	8260B	2.0 µg/L			
1,2-dichlorobenzene	8260B	2.0 µg/L			
1,3-dichlorobenzene	8260B	2.0 µg/L			
1,4-dichlorobenzene	8260B	2.0 µg/L			
Dichlorodifluoromethane	8260B	5.0 µg/L			
1,1-dichloroethane	8260B	2.0 µg/L			
1,2-dichloroethane	8260B	2.0 µg/L			
1,1-dichloroethene	8260B	5.0 µg/L	59-172	± 14	90
Cis-1,2-dichloroethene	8260B	2.0 µg/L			
Trans-1,2-dichloroethene	8260B	2.0 µg/L			
1,2-Dichloropropane	8260B	2.0 µg/L			
1,3-Dichloropropane	8260B	2.0 µg/L			
2,2-Dichloropropane	8260B	2.0 µg/L			
1,1-Dichloropropene	8260B	2.0 µg/L			
Cis-1,3-Dichloropropene	8260B	2.0 µg/L			
Trans-1,3-Dichloropropene	8260B	2.0 µg/L			
Ethylbenzene	8260B	2.0 µg/L			
Hexachlorobutadiene	8260B	5.0 µg/L			
2-Hexanone	8260B	10 µg/L			
Isopropylbenzene	8260B	2.0 µg/L			
p-Isopropyltoluene	8260B	2.0 µg/L			
Methylene chloride	8260B	5.0 µg/L			
4-Methyl-2-Pentanone (MIBK)	8260B	10 µg/L			
Methyl-tert Butyl Ether (MTBE)	8260B	5.0 µg/L			
Napthalene	8260B	5.0 µg/L			

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
n-Propylbenzene	8260B	2.0 µg/L			
Styrene	8260B	2.0 µg/L			
1,1,1,2-Tetrachloroethane	8260B	5.0 µg/L			
1,1,2,2-Tetrachloroethane	8260B	2.0 µg/L			
Tetrachloroethene	8260B	2.0 µg/L			
Toluene	8260B	2.0 µg/L	59-139	± 13	90
1,2,3-Trichlorobenzene	8260B	5.0 µg/L			
1,2,4-Trichlorobenzene	8260B	5.0 µg/L			
1,1,1-Trichloroethane	8260B	2.0 µg/L			
1,1,2-Trichloroethane	8260B	2.0 µg/L			
Trichloroethene	8260B	2.0 µg/L	62-137	± 14	90
Trichlorofluoromethane	8260B	5.0 µg/L			
1,2,3-Trichloropropane	8260B	10 µg/L			
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	8260B	5.0 µg/L			
1,2,4-Trimethylbenzene	8260B	2.0 µg/L			
1,3,5-Trimethylbenzene	8260B	2.0 µg/L			
Vinyl Chloride	8260B	5.0 µg/L			
o-Xylene	8260B	2.0 µg/L			
m,p-Xylene	8260B	2.0 µg/L			
Metals					
Antimony	6020 (ICP/MS)	2.0 µg/L	80-120	± 20	90
Arsenic	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Barium	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Beryllium	6020 (ICP/MS)	0.50 µg/L	80-120	± 20	90
Cadmium	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Chromium	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Cobalt	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Copper	6020 (ICP/MS)	2.0 µg/L	80-120	± 20	90
Lead	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Molybdenum	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Nickel	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Selenium	6020 (ICP/MS)	2.0 µg/L	80-120	± 20	90
Silver	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Thallium	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Vanadium	6020 (ICP/MS)	1.0 µg/L	80-120	± 20	90
Zinc	6020 (ICP/MS)	20 µg/L	80-120	± 20	90

TABLE 2
Measurement Performance Objectives
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Parameter	Method	Target Detection Limit	Analytical Accuracy (Percent Recovery)	Analytical Precision (Relative Percent Deviation)	Overall Completeness (Percent)
Investigation-Derived Wastewater					
Volatile Organics ^a	TCLP(1311) ^b , California Title 22	TCLP or STLC levels, the lower of the two ^c	50-150	± 30	90
Metals ^a			75-125	± 30	90
Pesticides/ PCBs ^a			45-145	± 30	90

Notes:

^aQuantification of analytes shall occur after extraction using the TCLP per EPA 1311 and California Title 22 Waste Extraction Test (WET) methods. Target analytes are listed in Table 1 and 2 in Appendix B. Additional analysis may be required as identified by the waste facility.

^bTCLP Method 1311 leachate will be analyzed per Methods 8260B, 8081A, 8082 and 6020, per EPA SW846 Test Methods for Evaluating Solid Waste, 3rd Edition and updates.

^cDetection limits for specific analytes are listed in Appendix B.

NA – Not applicable

µg/L – micrograms per liter

TABLE 3
Summary of On or Near Property Objective-Specific Sampling Protocols
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Boring Type	Sample Depth (feet bgs)	Pesticides Protocol ^{1, 2 & 5} EPA Method 8081A		VOC Protocol ³	Metals Protocol ⁴
		DDT	BHC	EPA Method 8260B	EPA Method 6010B
Shallow Borings (reworked and Shallow Native)	1	X	X	X	X
	3	X	X	X	X
	5	X	X	X	X
	7	X	X	X	X
	10	X	X	X	X
	15	X	X	X	X
Deep Borings (reworked and native soil to 60 and/or 90 feet)	1	X	X	X	X
	3	X	X	X	X
	5	X	X	X	X
	7	X	X	X	X
	10	X	X	X	X
	15	X	X	X	X
	20	X	X	X	X
	30	X	X	X	X
	40	X	X	X	X
	50	X	X	X	X
60, 70, 80 & 90	X	X	X	X	

Notes:

^a All corrective actions shall be documented, and all records shall be maintained by the laboratory.

Soil from borings exhibiting evidence of NAPL (e.g. staining or odor) shall be sampled and analyzed by EPA Methods 8260B and 8081A.

Soil samples will be analyzed using data quality parameters specified in this Revised QAPP.

X= Sample collected for analysis

BHC= Benzene hexachloride

bgs = below ground surface

VOC= volatile organic compounds

DDT= Dichlorodiphenyl-trichloroethane

PRG= preliminary remediation goals

Footnotes:

1. The samples collected from shallow borings (to 15 feet bgs) shall be analyzed by the laboratory for DDT by EPA Method 8081A using data quality parameters specified in the Revised QAPP and all DDT isomers (including the 2,4'- isomers) shall be quantitated. Also, these samples shall be analyzed by the laboratory for BHC by EPA Method 8081A with special handling requested for BHC extraction and analysis, and data quality parameters specified in the Revised QAPP. All BHC isomers shall be characterized, and limits of detection for total BHC shall be below 0.36 mg/kg (i.e., alpha-BHC industrial PRG). All constituents detected by EPA Method 8081A shall be reported to EPA.

2. The samples collected from deep borings will be sampled for DDT and BHC and analyzed by EPA Method 8081A, using data quality parameters specified in the Revised QAPP, with special handling requested for BHC. All DDT and BHC isomers shall be characterized, and limits of detection for total BHC will be at or below 0.36 mg/kg (i.e., alpha-BHC industrial PRG). All constituents detected by EPA Method 8081A shall be reported to EPA.

3. In the field, a separate sample from the same depth interval as each sample shall be subjected to head-space analysis using a photo-ionization detector (PID) and flame-ionization detector (FID) or similar equipment, and the findings reported. With the exception of those soil samples from six (6) borings, all collected samples will be submitted for laboratory VOC analysis. All detected constituents shall be reported to EPA. Samples collected from six borings located along the eastern-most edge of the Montrose Plant Property (i.e., C12, C19, C28, C37, C47 and C53) will be subjected to head-space analysis in the field using a PID/FID, and submitted for laboratory VOC analysis if PID/FID readings exceed 10 ppm. Chemicals of interest vary by location, but include: MCB, dichlorobenzenes, chloral hydrate, chloroform, BTEX, and PCE, TCE, and DCE and related degradation compounds.

4. All soil samples collected from each shallow and deep boring will be submitted to the laboratory for metals analysis, and a 2-week turnaround will be requested for total chromium analysis. If total chromium results exceed the industrial PRG for hexavalent chromium (Cr⁶⁺, 64 parts per million [ppm]), resubmit the sample for analysis of Cr⁶⁺ by EPA Method 7199. The holding times for hexavalent chromium in soil are 30 days for extraction and 24 hours after extraction. EPA Methods with limits of detection significantly below the analyte-specific benchmark values, will be used for metals analysis, and data quality parameters specified in this Revised QAPP.

5. All DDT, DDE and DDD isomers (including the 2,4'- isomers) and BHC isomers shall be quantitated and individually reported.

TABLE 4
Summary of Off-Property Objective-Specific Sampling Protocols
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Sampling Depth (feet bgs)	LADWP Right-of-Way, Farmer Bros. Property		Western Waste Parcel			Business Area East of Normandie
			Swale area	East of swale	Southwestern area	
Surface: Upper 6 inches	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	DDT and BHC
2	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	DDT and BHC
4	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	NA
6	DDT	BHC	DDT and BHC	NA	DDT and BHC	NA
8	NA	NA	DDT and BHC	NA	NA	NA

Notes:

All DDT and /or BHC samples will be sent to the laboratory for analysis by EPA Method 8081A.

All DDT, DDE and DDD isomers (including the 2,4'- isomers) and BHC isomers shall be quantitated and individually reported. Note: all constituents detected by EPA Method 8081A shall be reported to EPA.

NA - not analyzed

TABLE 5
Calibration and Quality Control Procedures for Method SW8081A
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW8081A	Organo-chlorine pesticides	Five-point initial calibration for all analytes	Initial calibration prior to sample analysis	Linear - mean RSD for all analytes $\leq 20\%$ with no individual analyte RSD $> 30\%$ Linear - least squares regression $r > 0.995$ Nonlinear - COD ≥ 0.990 (6 points shall be used for second order, 7 points shall be used for third order)	Correct problem then repeat initial calibration
		Second-source calibration verification for all analytes	Once per 5-point initial calibration	All analytes within $\pm 15\%$ of expected value	Correct problem then repeat initial calibration
		Retention time (RT) window calculated for each analyte	Every 6 months	± 3 times standard deviation for each analyte retention time from 72-hour study	None
		Initial calibration verification	Daily, before sample analysis	All analytes within $\pm 15\%$ of expected value	Correct problem then repeat initial calibration
		Calibration verification	After every 20 samples or 12 hour period and at the end of the analysis sequence	All analytes within $\pm 15\%$ of expected value and all compounds correctly identified by RT	Correct problem then repeat initial calibration verification and reanalyze all samples since last successful calibration verification
		Breakdown check (Endrin and DDT)	Daily prior to analysis of samples, and every 12 hour shift	Degradation $\leq 15\%$	Repeat breakdown check

TABLE 5
Calibration and Quality Control Procedures for Method SW8081A
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW8081A	Organo-chlorine pesticides	Method blank	One per analytical batch	No analytes detected \geq RL (Tables G and H in Appendix B)	Correct problem then reprep and analyze method blank and all samples processed with the contaminated blank unless samples are ND or $>10x$ the blank value for the analyte
		LCS for all analytes	One LCS per analytical batch	QC acceptance criteria, per Tables G and H in Appendix B	Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch unless LCS is high and samples are ND for the affected analyte
		Surrogate spike	Every sample, spiked sample, standard, and method blank	QC acceptance criteria, per Tables G and H in Appendix B	Correct problem then re-extract and analyze sample
		MS/MSD	One MS/MSD per every 20 project samples per matrix	QC acceptance criteria per Appendix B	None
		Second-column confirmation (excluding toxaphene and chlordane)	100% for all positive results	Same as for initial or primary column analysis	Same as for initial or primary column analysis
		MDL study	One full MDL run originally. Verified every quarter	MDLs established per 40 CFR – Part 136	None
Results reported between MDL and RL	None	None	None		

Notes:

^a – All corrective action shall be documented and all records shall be maintained by the laboratory

RSD – relative standard deviation

RL – reporting limit

MDL – method detection limit

LCS – laboratory control sample

MS/MSD – matrix spike/matrix spike duplicate

COD – coefficient of determination

ND – non detect

RT – retention time

r – correlation coefficient

TABLE 6
Summary of Calibration and Quality Control Procedures for Cr VI (Method 7199)
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
7199	Hexavalent Chromium	Five point initial calibration	Initial calibration prior to sample analysis	$r > 0.999$	Correct problem then continue
		Second source calibration	Once per 5-point calibration	$\pm 10\%$	Correct problem then repeat
		Retention time window calculated	Each initial calibration and calibration verification	± 0.5 min.	Correct problem then repeat
		Initial calibration verification	Every 20 samples	Within $\pm 10\%$ of expected value	Correct problem then repeat
		Calibration verification	After every 20 samples	Within $\pm 10\%$ of expected value	Correct problem then repeat
		Laboratory control standard	Every 20 samples	70-140%	Correct problem then repeat
		Method blank	Every 20 samples	No analyte detected \geq RL (0.2 mg/kg)	Find problem, repeat or footnote
		MS/MSD or Dup/MS	Every 20 samples	70-140% RPD $\pm 40\%$	Find problem, repeat or footnote
		MDL Study	Every 12 months	< 1 mg/kg	None

Notes

^a All corrective action shall be documented and the records maintained by the laboratory

r – correlation coefficient

RL - reporting limit

RPD – relative percent difference

MS/MSD matrix spike / matrix spike duplicate

Dup/MS - sample duplicate/ matrix spike

MDL - method detection limit

mg/kg - milligrams per kilogram

TABLE 7
Summary of Calibration and Quality Control Procedures of Method SW8260B
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW8260B	Volatile Organics	Five-point initial calibration for all analytes	Initial calibration prior to sample analysis	SPCCs average RF \geq 0.30 ^b ; and %RSD for RFs for CCCs \leq 30%; and one option below: Option 1 Linear-mean RSD for all analytes \leq 15% with no individual analyte RSD $>$ 30% Option 2 Linear-least squares regression $r >$ 0.995 Option 3 Non-linear- COD \geq 0.990 (6 points shall be used for second order, 7 points shall be used for third order)	Correct problem then repeat initial calibration
		Second-source calibration verification	Once per five-point initial calibration	All analytes within in-house recovery limits	Correct problem then repeat initial calibration
		Retention time window	Each initial calibration and calibration verifications	Relative retention time (RRT) of the analyte within \pm 0.06 RRT units of the RRT	Correct problem then reanalyze all samples analyzed since the last retention time check
		Calibration verification	Daily, before sample analysis and every 12 hours of analysis time	SPCCs average RF \geq 0.30 ^b ; and CCCs \leq 20% difference (when using RFs) or drift (when using least squares regression or non-linear calibration) All other analytes within in-house recovery limits	Correct problem then repeat initial calibration
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyzes of a QC check sample	Once per analyst	QC acceptance criteria, per Tables E and F in Appendix B.	Recalculate results; locate and fix problem with system and then rerun demonstration for those analytes that did not meet criteria

TABLE 7
Summary of Calibration and Quality Control Procedures of Method SW8260B
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW8260B	Volatile Organics	Check of mass spectral ion intensities using BFB	Prior to initial calibration and calibration verification	Refer to criteria listed in the method description	Retune instrument and verify
		IS	Every sample calibration check standard method blank, LCS, and MS/MSD	Retention time ± 30 seconds from retention time of the last mid-point std. EICP area within -50% to +100% of last mid-point std.	Inspect mass spectrometer and GC for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning
		Method blank	One per analytical batch	No analytes detected \geq RL	Correct problem then re-prepare and analyze method blank and all samples processed with the contaminated blank unless samples are ND or $> 20x$ blank value for the analyte
		LCS for all analytes	One LCS per analytical batch	QC acceptance criteria, per Tables E and F in Appendix B	Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch unless LCS is high and samples are ND for the affected analyte
		Surrogate spike	Every sample, spiked sample, standard, and method blank	QC acceptance criteria, per Tables E and F in Appendix B	Correct problem then re-extract and analyze sample
		MS/MSD	One MS/MSD per every 20 project samples per matrix	QC acceptance criteria, per Appendix B	none
		MDL study	One full MDL originally. Verification every quarter	MDLs established per 40CFR - part 136	none
		Results reported between MDL and RL	none	none	none

TABLE 7
Summary of Calibration and Quality Control Procedures of Method SW8260B
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

- If %RSD for any analyte is > 15%, regression fit may be used for the calibration curve for that analyte. Acceptance criteria for first order regression is $r \geq 0.995$.

Notes:

- a. All corrective actions shall be documented, and all records shall be maintained by the laboratory.
- b. Except > 0.10 for bromoform, and ≥ 0.10 for chloromethane and 1,1-dichloroethane

SPCC – system performance check compound

CCC – calibration check compound

RF – response factor

RSD – relative standard deviation

COD – coefficient of determination

RRT – relative retention time

BFB – 4-bromofluorobenzene

IS – internal standard

EICP – extracted ion current profile

RL – reporting limit

LCS – laboratory control sample

MS/MSD – matrix spike / matrix spike duplicate

MDL – method detection limit

ND – non detect

TABLE 8
Summary of Calibration and Quality Control Procedures for Method SW6020
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW6020	ICPMS Metals	MS tuning sample	Prior to initial calibration and calibration verification	SW6020 paragraph 5.8	Retune instrument then reanalyze tuning solution
		Initial multipoint calibration (3 standards and a blank in triplicate)	Daily initial calibration prior to sample analysis	Correlation coefficient must be ≥ 0.995	If applicable, correct problem and repeat initial calibration
		Initial calibration verification (second source standard) (ICV)	After initial calibration before beginning a sample run	All analytes within $\pm 10\%$ of expected value	Reanalyze once. Correct problem then repeat initial calibration
		Calibration blank	After ICV and CCV	No analytes detected \geq RL	Reanalyze once. Correct problem then analyze calibration blank and previous 10 samples
		Continuing calibration verification (Instrument Check Standard) (CCV)	After every 10 samples and at the end of the analysis sequence	All analyte(s) within $\pm 10\%$ of expected value	Correct problem then repeat calibration and reanalyze all samples since last successful calibration
		Linear range calibration (high) check standard	Every three months	Analyte within $\pm 10\%$ of expected value	Correct problem then reanalyze or re-set linear range
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyzes of a QC check sample	Once per analyst	QC acceptance criteria, per Tables C and D in Appendix B.	Recalculate results; locate and fix problem with system and then rerun demonstration for those analytes that did not meet criteria
		Method blank	One per analytical batch	No analytes detected \geq RL	Correct problem then reprep and analyze method blank and all samples processed with the contaminated blank unless samples are ND or $> 10x$ blank value for the analyte
		LCS for the analyte	One LCS per analytical batch	QC acceptance criteria, per Tables C and D in Appendix B.	Correct problem then reanalyze If still out, reprep and analyze the LCS and all samples in the affected analytical batch unless LCS is high and samples are ND for the affected analyte
		Interference check solution (ICS-A and ICS-AB)	At the beginning of an analytical run and every 12 hour period	ICS-A All target analytes ± 5 ppb (Zn: 15 ppb) ICS-AB Within $\pm 30\%$ (Zn: 50%) of expected value	Terminate analysis; locate and correct problem; reanalyze ICS; reanalyze all affected samples
		Post digestion spike addition	When MS/MSD fails	Recovery within 75-125% of expected results	Dilute the sample; then reanalyze post digestion spike addition
		Internal Standards (ISs)	Every sample	IS intensity within 30-120% of intensity of the IS in the initial calibration	Perform corrective action as described in method SW6020 section 8.3
MS/MSD	One MS/MSD per every 20 project samples per matrix	QC acceptance criteria, per Appendix B	none		

TABLE 8
Summary of Calibration and Quality Control Procedures for Method SW6020
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action ^a
SW6020 (Cont.)	ICPMS Metals	MDL study	Once per 6 month period	MDLs established per CFR 40 -Part 136	none
		Results reported between MDL and RL	None	none	none

Notes

^a All corrective actions shall be documented, and all records shall be maintained by the laboratory.

CCV – continuing calibration verification

ICV – initial calibration verification

IS – internal standard

RL – reporting limit

LCS – laboratory control sample

MS/MSD – matrix spike / matrix spike duplicate

MDL – method detection limit

ICP – inductively coupled plasma

MS – mass spectrometry

ND – non detect

ICS – interference check solution