SOLICITATION, OFFER AND AWARD	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE OF PAGES
2. CONTRACT NUMBER	3. SOLICITATION NUMBER PR-HQ-00-11943	4. TYPE OF SOLICITATION [ ] SEALED BID (IFB) [X] NEGOTIATED (RFP)	5. DATE ISSUED 08/29/01	6. REQUISITION/PURCHASE NUMBER PR-HQ-00-11943

7. ISSUED BY (Hand Carried/Courier Address) CODE	8. ADDRESS OFFER TO (If other than Item 7) (U. S. Mail Only)
Environmental Protection Agency Bid and Proposal Room, Ronald Reagan Building, 6th Floor (3802R) 1300 Pennsylvania Avenue, N.W. Washington, DC, DC 20004	Environmental Protection Agency Bid and Proposal Room, Ariel Rios Building (3802R) 1200 Pennsylvania Avenue, N.W. Washington, DC 20460

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder"

SOLICITATION

9. Sealed offers in original and 1 copies for furnishing the supplies or services in the Schedule will be received at the place specified in item 8, or if handcarried, in th
until 03:00 PM (Hour) local time 09/28/2001 (Date)

CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L, Provision No. 52.214-7 or 52.215-1 All offers are subject to all terms and conditions con

10. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE (NO COLLECT)			C. E-MAIL ADDRESS
		AREA CODE	NUMBER	EXT.	
	BARBARA H. STEARRETT	202	564-4496		stearrett.barbara@epa.gov

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	G	CONTRACT ADMINISTRATION DATA			L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	H	SPECIAL CONTRACT REQUIREMENTS			M	EVALUATION FACTORS FOR AWARD	

OFFER (Must be fully completed by offeror)

NOTE: Item 12 does not apply if the solicitation includes the provisions in 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calender days (120 calendar days unless a different period is ins
date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated poi
the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause 52-232-8)	10 CALENDAR DAYS %	20 CALENDAR DAYS %	30 CALENDAR DAYS %	__ CALENDAR DAYS %
14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated:)	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE

15A. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

15B. TELEPHONE NUMBER AREA CODE	NUMBER	EXT.	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER [ ] SUCH ADDRESS IN SCHEDULE	17. SIGNATURE	18. OFFER DATE

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: [ ] 10 U.S.C. 2304(c)( ) [ ] 41 U.S.C. 253(c)( )	23. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	ITEM

24. ADMINISTERED BY (If other than item 7) CODE	25. PAYMENT WILL BE MADE BY CODE:
	Environmental Protection Agency Research Triangle Park Financial Management Center (MD-32) Research Triangle Park, NC 27711

26. NAME OF CONTRACTING OFFICER (Type or print)	27. UNITED STATES OF AMERICA (Signature of Contracting Officer)	28. AWARD DATE

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

AUTHORIZED FOR LOCAL REPRODUCTION
Previous edition is unusable

STANDARD FORM 33 (REV. 9-97)
Prescribed by GSA - FAR (48 CFR) 53.214(c)

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PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS

B.1 FIXED PRICES--INDEFINITE DELIVERY/INDEFINITE QUANTITY CONTRACT (EP 52.216-135) (APR 1984)

The contractor shall provide analytical services as described in the Statement of Work, Attachments 1 through 8, at fixed prices established at the time of individual Task Order Award.

In the event the contractor is not awarded a task order under the competitive procedures described in Section G of this contract the following prices will be used by the Government to issue unilateral task orders in order to meet contract minimums:

		Unit Price
0001	Water Sample	$_____
0002	Soil/Sediment Sample	$_____

B.2 MINIMUM AND MAXIMUM AMOUNTS (EP 52.216-140) (APR 1984)

During the period specified in the "Ordering" clause, the Government shall place orders totaling a minimum of $_____ (To Be Determined at Contract Award). The amount of all orders shall not exceed $_____ (To Be Determined at Contract Award).

The minimum amount of combined orders to be placed under the contracts resulting from solicitation PR-HQ-00-11943 is $50,000. The Minimum amount of each contract will be determined by dividing $50,000 by the number of contracts to be awarded.

The maximum amount of combined orders to be placed under the contracts resulting from solicitation PR-HQ-00-11943 is $5,000,000.00. The Maximum amount of each contract will be determined by subtracting the sum of the contract minimums, excluding your own, from the program maximum $5,000,000.

To illustrate if 5 contracts are to be awarded the maximum of each contract will be:

Minimum = $50,000/5 contracts = $10,000 per contract

Maximum = $5,000,000 - ($10,000 * 4) = $4,960,000

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C.1 NOTICE REGARDING PROHIBITED CONTRACTOR ACTIVITIES ON ENVIRONMENTAL PROTECTION AGENCY (EPA) CONTRACTS (EP 52.000-000) (NOV 1994)

The Contractor shall not perform any of the following activities on behalf of EPA in connection with this contract:

1. The actual preparation of Congressional testimony.

2. The interviewing or hiring of individuals for employment at EPA.

3. Developing and/or writing of Position Descriptions and Performance Standards.

4. The actual determination of Agency policy.

5. Participating as a voting member on a Performance Evaluation Board; participating in and/or attending Award Fee meetings.

6. Preparing Award Fee Letters, even under typing services contracts.

7. The actual preparation of Award Fee Plans.

8. The preparation of documents on EPA Letterhead other than routine administrative correspondence.

9. Reviewing vouchers and invoices for the purposes of determining whether costs, hours, and work performed are reasonable.

10. The preparation of Statements of Work, Work Assignments, Technical Direction Documents, Delivery Orders, or any other work issuance document under a contract that the contractor is performing or may perform. Such a work issuance document, prepared by an EPA prime contractor under an EPA prime contract for its subcontractor, is exempt from this prohibition.

11. The actual preparation of responses to audit reports from the Inspector General, General Accounting Office, or other auditing entities.

12. Preparing responses to Congressional correspondence.

13. The actual preparation of responses to Freedom of Information Act requests, other than routine, non-judgmental correspondence.

14. Any contract which authorizes a contractor to represent itself as EPA to outside parties.

15. Conducting administrative hearings.

16. Reviewing findings concerning the eligibility of EPA employees for security clearances.

17. The actual preparation of an office's official budget request.

C.2 STATEMENT OF WORK/SPECIFICATIONS (EP 52.210-100) (APR 1984)

The Contractor shall furnish the necessary personnel, material, equipment, services and facilities (except as otherwise specified), to perform the Statement of Work/Specifications included at Attachment 1 through 8.

C.3 COMPLIANCE WITH EPA POLICIES FOR INFORMATION RESOURCES MANAGEMENT (EPAAR 1552.211-79) (OCT 2000)

(a) Definition. Information Resources Management (IRM) is defined as any planning, budgeting, organizing, directing, training, promoting, controlling, and managing activities associated with the burden, collection, creation, use and dissemination of information. IRM includes both information itself, and the management of information and related resources such as personnel, equipment, funds, and technology. Examples of these services include but are not limited to the following:

(1) The acquisition, creation, or modification of a computer program or automated data base for delivery to EPA or use by EPA or contractors operating EPA programs.

(2) The analysis of requirements for, study of the feasibility of, evaluation of alternatives for, or design and development of a computer program or automated data base for use by EPA or contractors operating EPA programs.

(3) Services that provide EPA personnel access to or use of computer or word processing equipment, software, or related services.

(4) Services that provide EPA personnel access to or use of: Data communications; electronic messaging services or capabilities; electronic bulletin boards, or other forms of electronic information dissemination; electronic record-keeping; or any other automated information services.

(b) *General*. The Contractor shall perform any IRM related work under this contract in accordance with the IRM policies, standards and procedures set forth in this clause and noted below. Upon receipt of a work request (i.e. delivery order or work assignment), the Contractor shall check this listing of directives (see paragraph (d) for electronic access). The applicable directives for performance of the work request are those in effect on the date of issuance of the work request.

(1) IRM Policies, Standards and Procedures. The 2100 Series (2100-2199) of the Agency's Directive System contains the majority of the Agency's IRM policies, standards and procedures.

(2) Groundwater Program IRM Requirement. A contractor performing any work related to collecting Groundwater data; or developing or enhancing data bases containing Groundwater quality data shall comply with *EPA Order 7500.1A - Minimum Set of Data Elements for Groundwater*.

(3) EPA Computing and Telecommunications Services. *The Enterprise Technology Services Division (ETSD) Operational Directives Manual* contains procedural information about the operation of the Agency's computing and telecommunications services. Contractors performing work for the Agency's National Computer Center or those who are developing systems which will be operating on the Agency's national platforms must comply with procedures

established in the Manual. (This document may be found at: http://basin.rtpnc.epa.gov:9876/etsd/directives.nsf.)

(c) *Printed Documents*. Documents listed in (b)(1) and (b)(2) may be obtained from:

U.S. Environmental Protection Agency
Office of Administration
Facilities Management and Services Division
Distribution Section
Mail Code: 3204
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460
Phone: (202) 260-5797

(d) *Electronic Access*. Electronic access. A complete listing, including full text, of documents included in the 2100 Series of the Agency's Directive System is maintained on the EPA Public Access Server on the Internet at http://epa.gov/docs/irmpoli8/.

C.4 ACQUISITION AND USE OF ENVIRONMENTALLY PREFERABLE PRODUCTS AND SERVICES (EP-S 97-1) (MAY 1999)

(a) Executive Order 13101 of September 14, 1998, entitled "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition" and Section 6002 of the Resource Conservation and Recovery Act (RCRA) of 1976, as amended (42 U.S.C. 6962, Pub L. 94-580, 90 Stat. 2822) require Federal agencies to procure designated items with the highest recovered materials content practicable.

(b) In the performance of this contract, the Contractor shall comply with the requirements of the following issuances:

(1) Title 40 of the Code of Federal Regulations, Part 247, Comprehensive Guideline for Procurement of Products Containing Recovered Materials (CPG), which designates items that are or can be made with recovered materials, and its companion pieces, the Recovered Materials Advisory Notices (RMANs). The CPG and RMANs provide recommended procurement practices, including recommended recovered material content levels, for purchasing products designated in the CPG. The Contractor shall comply with these recommendations, and such other CPG revisions and RMANs as the Environmental Protection Agency (EPA) may issue with respect to the procurement of products that contain recovered materials. (Copies of the CPG or RMANs, as well as information on manufacturers and vendors of designated items may be obtained by calling EPA's RCRA Hotline at (800) 424-9346, or, in the Washington, D.C., metropolitan area, at (703) 412-9810.)

(2) In complying with the requirements of paragraph (b), the Contractor shall coordinate its concerns and program guidance with EPA's Recycling Coordinator.

(c) The Contractor shall prepare and submit reports on the purchase of products containing recovered materials from time to time in accordance with written direction (e.g., in specified format) from the EPA Recycling Coordinator through the Contracting Officer. Reports shall be submitted to the EPA Recycling Coordinator, with a copy to the Contracting Officer, Mail Code 3204, Washington, D.C. 20460.

SECTION D - PACKAGING AND MARKING

D.1 SHIPMENT AND MARKING (EP 52.247-100) (APR 1984)

For packaging and marking requirements, please refer to the Statement of Work Exhibits B and H.

SECTION E - INSPECTION AND ACCEPTANCE

E.1 NOTICE Listing Contract Clauses Incorporated by Reference

NOTICE:

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

NUMBER	DATE	TITLE
52.246-4	AUG 1996	INSPECTION OF SERVICES--FIXED-PRICE

E.2 INSPECTION AND ACCEPTANCE (EP 52.246-100) (APR 1984)

(a) The Contracting Officer or the duly authorized representative will perform inspection and acceptance of materials and services to be provided.

(b) For the purposes of this clause, the Project Officer or Task Order Project Officer is the authorized representative of the Contracting Officer.

(c) Inspection and acceptance will be performed at:

To be Specified in each Task Order

E.3 GOVERNMENT AUDIT OF CONTRACTOR FACILITIES

During the contract period of performance the Government may audit the Contractor’s operations in order to determine whether the Contractor is maintaining it’s ability to meet the terms and conditions of this contract. These audits may or may not be preplanned so that the Government auditors have the opportunity to observe how work in process is normally being performed.

SECTION F - DELIVERIES OR PERFORMANCE

F.1 NOTICE Listing Contract Clauses Incorporated by Reference

NOTICE:

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

NUMBER	DATE	TITLE
52.242-15	AUG 1989	STOP WORK ORDER

F.2 WORKING FILES (EPAAR 1552.211-75) (APR 1984)

The Contractor shall maintain accurate working files (by task or work assignment) on all work documentation including calculations, assumptions, interpretations of regulations, sources of information, and other raw data required in the performance of this contract. The Contractor shall provide the information contained in its working files upon request of the Contracting Officer.

F.3 LOCATION OF PERFORMANCE

All work performed under this contract, including sample analyses, shall be performed at the location shown below. This restriction is based upon that location meeting the pre-award qualifications and evaluations. (Note: Offerors must fill in the address of the physical location of the laboratory. Only one location may be specified to be used in performance.)

_____

_____

_____

E-mail address:_____

Telephone Number:_____Facsimile Number:_____

F.4 STANDARD DELIVERY

Unless otherwise stated in individual task orders the standard required delivery due date will be 35 days after sample receipt.

SECTION G - CONTRACT ADMINISTRATION DATA

G.1 ORDERING--BY DESIGNATED ORDERING OFFICERS (EPAAR 1552.216-72) (APR 1984) DEVIATION

(a) The Government will order any supplies and services to be furnished under this contract by issuing delivery orders on Optional Form 347, or an agency prescribed form, from the effective date of the contract through the expiration date of the contract. In addition to the Contracting Officer, the following individuals are authorized ordering officers:

Any warranted Contracting Officer within the Superfund RCRA/Regional Procurement Operating Division acting within the authority of their warrant.

(b) A Standard Form 30 will be the method of amending delivery orders.

G.2 ORDERING-MULTIPLE AWARDS FOR THE SAME SERVICES

(A) In order to determine which contractor will be awarded task orders under this multiple award contract the following factors will be considered:

1. Performance History under this contract, and
2. Price

(B) It is anticipated that all requirements will be competed amongst all contract holders. The Government may issue non-competitive orders when circumstances as described in FAR 16.505(b)(2) "Exceptions to the Fair Opportunity Process" are present.

(C) The competitive process is envisioned to be:

1. The Contracting Officer will send a Request for Quote (RFQ) to all contract holders containing the Statement of Requirements with a due date for quotes, generally five (5) working days after RFQ issuance but subject to change if an emergency situation exists, via electronic mail.

2. Offerors will submit their fixed price quotes and Conflict of Interest Disclosure statements.

3. Award will be made to the contractor, in good standing based on performance history, offering the lowest price, unless otherwise stated in the RFQ.

(D) Each awardee must participate in the task order process and be available to perform if selected, unless one of the following situations is present, documented, and agreed upon by the Contracting Officer:

1. Conflict of Interest,

2. Capacity Limitations, or

3. Other compelling factor which the Contracting Officer determines

would affect the contractor's ability to perform the work.

G.3 CONTRACT ADMINISTRATION REPRESENTATIVES (EP 52.242-100) (AUG 1984)

Project Officer(s) for this contract:

Project Officer:

TO BE IDENTIFIED AT TIME OF CONTRACT AWARD

Contract Specialist(s) responsible for administering this contract:

Administrative Contracting Officer:

TO BE IDENTIFIED AT TIME OF CONTRACT AWARD

G.4 GOVERNMENT FURNISHED SAMPLES

Samples for Analysis - A sample consists of collection containers containing solid or liquid material, or a mixture.

Field Sample Blank(s) and duplicate samples shall constitute separate distinct sample(s).

If the performance of all or any part of the work of this contract is delayed or interrupted due to the Government's failure to provide timely instructions/resolution to the Contractor regarding inconsistencies or errors in samples or their corresponding paperwork (chain-of-custody/traffic reports), the Contractor may be entitled to an adjustment in the time of delivery. Such adjustment shall include a day-for-day extension for the delay caused by the Government. However, the Contractor shall provide clear and convincing documentation of the delay. No adjustment will be made for any delay or interruption to the extent that performance would have been delayed by other causes including the fault or negligence of the contractor, or for which adjustment is provided or excluded under any other term or condition of this contract. In addition, no adjustment may be made if the contractor fails to promptly notify the Task Order Project Officer (TOPO) and Contracting Officer (CO) of problems or discrepancies. Such prompt notification is interpreted to mean within the next business day of sample(s) and/or Chain-of-Custody/Traffic Report receipt. The TOPO shall be the first person contacted for problem resolution. Verbal notification shall be followed up in writing to both the TOPO and CO. Electronic messages will be considered written notification for these purposes.

Unless otherwise instructed by the TOPO, the Contractor shall dispose of unused sample volume as specified in Exhibit A of the SOW. Sample disposal and disposal of unused sample bottles/containers is the responsibility of the Contractor.

The Contractor shall be required to routinely return sample shipping containers (e.g., coolers and/or sample containers) to the appropriate location as specified in individual Task Orders within fourteen (14) calendar

days following shipment receipt. The Contractor will be provided a shipping mechanism by the originating sampler or the Government (e.g., field sampler). The Contractor shall ensure that the account numbers provided are used only for the return of Government-owned shipping containers.

Laboratories shall remove packing and other materials from the coolers before each pick-up and shall ensure that the coolers are clean. The laboratory Contractor can determine from visual inspection whether the cooler is clean. Laboratories shall remove any remaining sample from the non-glass container and shall ensure that the sample container is clean. An authorized laboratory official shall sign and telefax pick-up records to the designated transportation Contractor or sampler within two (2) calendar days of cooler pick-up for return shipment.

Laboratory Evaluation Sample Standards - The Government may provide to the Contractor either a standard extract to prepare the laboratory evaluation sample (LES), also referred to as a Performance Evaluation Sample (PES), or prepared LES for exclusive use on this contract.

G.5 RISK OR LOSS OF GOVERNMENT SAMPLES

In accordance with FAR Part 45, the Contractor assumes the risk or and shall be responsible for any loss or destruction of, or damage to, samples provided for analysis upon their delivery. As a consequence of any loss or destruction of, or damage to, the samples, the Contractor may be liable for any re-sampling, re-analysis, and associated administrative costs related to those samples. However, the contractor is not responsible for samples properly consumed in the analysis. Upon the loss, destruction of, or damage to the Government provided samples, the Contracting Officer may initiate an equitable adjustment or claim in favor of the Government.

G.6 FEDERAL HOLIDAYS

The following days are considered Federal Holidays under the contract:

New Years Day
Martin Luther King’s Birthday
President’s Day
Memorial Day
Independence Day (July 4)
Labor Day
Columbus Day
Veteran’s Day
Thanksgiving Day
Christmas Day

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 DISPLAY OF EPA OFFICE OF INSPECTOR GENERAL HOTLINE POSTER (EPAAR 1552.203-71) (OCT 2000)

(a) For EPA contracts valued at $1,000,000 or more including all contract options, the contractor shall prominently display EPA Office of Inspector General Hotline posters in contractor facilities where the work is performed under the contract.

(b) Office of Inspector General hotline posters may be obtained from the EPA Office of Inspector General, ATTN: OIG Hotline (2443), 1200 Pennsylvania Avenue, NW, Washington, DC 20460, or by calling (202) 260-5113.

(c) The Contractor need not comply with paragraph (a) of this clause if it has established a mechanism, such as a hotline, by which employees may report suspected instances of improper conduct, and provided instructions that encourage employees to make such reports.

H.2 PRINTING (EPAAR 1552.208-70) (OCT 2000)

(a) *Definitions.*

"Printing" is the process of composition, plate making, presswork, binding and microform; or the end items produced by such processes and equipment. Printing services include newsletter production and periodicals which are prohibited under EPA contracts.

"Composition" applies to the setting of type by hot-metal casting, photo typesetting, or electronic character generating devices for the purpose of producing camera copy, negatives, a plate or image to be used in the production of printing or microform.

"Camera copy" (or "camera-ready copy") is a final document suitable for printing/duplication.

"Desktop Publishing" is a method of composition using computers with the final output or generation of camera copy done by a color inkjet or color laser printer. This is not considered "printing." However, if the output from desktop publishing is being sent to a typesetting device (i.e., Linotronic) with camera copy being produced in either paper or negative format, these services are considered "printing".

"Microform" is any product produced in a miniaturized image format, for mass or general distribution and as a substitute for conventionally printed material. Microform services are classified as printing services and includes microfiche and microfilm. The contractor may make up to two sets of microform files for archival purposes at the end of the contract period of performance.

"Duplication" means the making of copies on photocopy machines employing electrostatic, thermal, or other processes without using an intermediary such as a negative or plate.

"Requirement" means an individual photocopying task. (There may be multiple requirements under a Work Assignment or Delivery Order. Each requirement would be subject to the photocopying limitation of 5,000 copies of one page or 25,000 copies of multiple pages in the aggregate per requirement).

(b) *Prohibition.*

The contractor shall not engage in, nor subcontract for, any printing in connection with the performance of work under this contract. Duplication of

more than 5,000 copies of one page or more than 25,000 copies of multiple pages in the aggregate per requirement constitutes printing. The intent of the limitation is not to allow the duplication of final documents for use by the Agency. In compliance with EPA Order 2200.4a, EPA Publication Review Procedure, the Office of Communications, Education, and Media Relations is responsible for the review of materials generated under a contract published or issued by the Agency under a contract intended for release to the public.

(c) *Affirmative Requirements.*

(1) Unless otherwise directed by the contracting officer, the contractor shall use double-sided copying to produce any progress report, draft report or final report.

(2) Unless otherwise directed by the contracting officer, the contractor shall use recycled paper for reports delivered to the Agency which meet the minimum content standards for paper and paper products as set forth in EPA's Web site for the Comprehensive Procurement Guidelines at: http://www.epa.gov/cpg/.

(d) *Permitted Contractor Activities.*

(1) The prohibitions contained in paragraph (b) do not preclude writing, editing, or preparing manuscript copy, or preparing related illustrative material to a final document (camera-ready copy) using desktop publishing.

(2) The contractor may perform a requirement involving the duplication of less than 5,000 copies of only one page, or less than 25,000 copies of multiple pages in the aggregate, using one color (black), so long as such pages do not exceed the maximum image size of 10\3/4\ by 14\1/4\ inches, or 11 by 17 paper stock. Duplication services below these thresholds are not considered printing. If performance of the contract will require duplication in excess of these limits, contractors must immediately notify the contracting officer in writing. EPA may then seek a waiver from the Joint Committee on Printing, U. S. Congress. The intent of the limitation is to allow ``incidental'' duplication (drafts, proofs) under a contract. The intent of the limitation is not to allow the duplication of copies of final documents for use by the Agency or as distributed as instructed by the Agency.

(3) The contractor may perform a requirement involving the multi-color duplication of no more than 100 pages in the aggregate using color copier technology, so long as such pages do not exceed the maximum image size of 10\3/4\ by 14\1/4\ inches, or 11 by 17 paper stock. Duplication services below these thresholds are not considered printing. If performance of the contract will require duplication in excess of these limits, contractors must immediately notify the contracting officer in writing. EPA may then seek a waiver from the Joint Committee on Printing, U. S. Congress.

(4) The contractor may perform the duplication of no more than a total of 100 diskettes or CD-ROM's. Duplication services below these thresholds are not considered printing. If performance of the contract will require duplication in excess of these limits, contractors must immediately notify the contracting officer in writing. EPA may then seek a waiver from the Joint Committee on Printing, U. S. Congress.

(e) *Violations.*

The contractor may not engage in, nor subcontract for, any printing in connection with the performance of work under the contract. The cost of any printing services in violation of this clause will be disallowed, or not accepted by the Government.

(f) *Flowdown Provision*.
The contractor shall include in each subcontract which may involve a requirement for any printing/duplicating/copying a provision substantially the same as this clause.

H.3 ORGANIZATIONAL CONFLICTS OF INTEREST (EPAAR 1552.209-71) (MAY 1994)

(a) The Contractor warrants that, to the best of the Contractor's knowledge and belief, there are no relevant facts or circumstances which could give rise to an organizational conflict of interest, as defined in FAR Subpart 9.5, or that the Contractor has disclosed all such relevant information.

(b) Prior to commencement of any work, the Contractor agrees to notify the Contracting Officer immediately that, to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the firm may have. In emergency situations, however, work may begin but notification shall be made within five (5) working days.

(c) The Contractor agrees that if an actual or potential organizational conflict of interest is identified during performance, the Contractor will immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consultation with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

(d) Remedies - The EPA may terminate this contract for convenience, in whole or in part, if it deems such termination necessary to avoid an organizational conflict of interest. If the Contractor was aware of a potential organizational conflict of interest prior to award or discovered an actual or potential conflict after award and did not disclose it or misrepresented relevant information to the Contracting Officer, the Government may terminate the contract for default, debar the Contractor from Government contracting, or pursue such other remedies as may be permitted by law or this contract.

(e) The Contractor agrees to insert in each subcontract or consultant agreement placed hereunder, except for subcontracts or consultant agreements for well drilling, fence erecting, plumbing, utility hookups, security guard services, or electrical services, provisions which shall conform substantially to the language of this clause, including this paragraph (e), unless otherwise authorized by the Contracting Officer.

H.4 CONTRACTOR PERFORMANCE EVALUATIONS (EPAAR 1552.209-76) (MAY 1999)

The contracting officer shall complete a Contractor Performance Report (Report) within ninety (90) business days after the end of each 12 months of contract performance (interim Report) or after the last 12 months (or less) of contract performance (final Report) in accordance with EPAAR 1509.170-5. The contractor shall be evaluated based on the following ratings and performance categories:

Ratings: 0 = unsatisfactory,
1 = poor,
2 = fair,
3 = good,
4 = excellent,

5 = outstanding.

Performance Categories:

Quality: Compliance with contract requirements; accuracy of reports; effectiveness of personnel; and technical excellence.

Rating

0--Contractor is not in compliance and is jeopardizing achievement of contract objectives
1--Major problems have been encountered
2--Some problems have been encountered
3--Minor inefficiencies/errors have been identified
4--Contractor is in compliance with contract requirements and/or delivers quality products/services
5--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. It is expected that this rating will be used in those circumstances when contractor performance clearly exceeds the performance level described as "Excellent."

Cost Control: Record of forecasting and controlling target costs; current, accurate and complete billings; relationship of negotiated costs to actuals; cost efficiencies.

Rating

0--Contractor is unable to manage costs effectively
1--Contractor is having major difficulty managing costs effectively
2--Contractor is having some problems managing costs effectively
3--Contractor is usually effective in managing costs
4--Contractor is effective in managing costs and submits current, accurate, and complete billings
5--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. It is expected that this rating will be used in those circumstances when contractor performance clearly exceeds the performance level described as "Excellent."

Timeliness of Performance: Met interim milestones; reliability; responsive to technical direction; completed on time, including wrap-up and contract administration; met delivery schedules; no liquidated damages assessed.

Rating

0--Contractor delays are jeopardizing performance of contract objectives
1--Contractor is having major difficulty meeting milestones and delivery schedule
2--Contractor is having some problems meeting milestones and delivery schedule
3--Contractor is usually effective in meeting milestones and delivery schedule
4--Contractor is effective in meeting milestones and delivery schedule
5--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. It is expected that this rating will be used in those circumstances when contractor performance clearly exceeds the performance level described as

"Excellent."

Business Relations: Effective management, including subcontracts; reasonable/cooperative behavior; responsive to contract requirements; notification of problems; flexibility; pro-active versus reactive; effective small/small disadvantage business subcontracting program.

Rating

0--Response to inquiries, technical/service/administrative issues is not effective
1--Response to inquiries, technical/service/administrative issues is marginally effective
2--Response to inquiries, technical/service/administrative issues is somewhat effective
3--Response to inquiries, technical/service/administrative issues is usually effective
4--Response to inquiries, technical/service/administrative issues is effective
5--The contractor has demonstrated an outstanding performance level that justifies adding a point to the score. It is expected that this rating will be used in those circumstances when contractor performance clearly exceeds the performance level described as "Excellent."

(a) The contracting officer shall initiate the process for completing interim Reports within five (5) business days after the end of each 12 months of contract performance by requesting the project officer to evaluate contractor performance for the interim Report. In addition, the contracting officer shall initiate the process for completing final Reports within five (5) business days after the last 12 months (or less) of contract performance by requesting the project officer to evaluate contractor performance for the final Report. The final Report shall cover the last 12 months (or less) of contract performance. Within thirty (30) business days after the project officer receives a request from the contracting officer to complete an evaluation, the project officer shall:

(1) Complete a description of the contract requirements;

(2) Evaluate contractor performance and assign a rating for quality, cost control, and timeliness of performance categories (including a narrative for each rating);

(3) Provide any information regarding subcontracts, key personnel, and customer satisfaction;

(4) Assign a recommended rating for the business relations performance category (including a narrative for the rating); and

(5) Provide additional information appropriate for the evaluation or future evaluations.

(b) The contracting officer shall:

(1) Ensure the accuracy of the project officer's evaluation by verifying that the information in the contract file corresponds with the designated project officer's ratings;

(2) Assign a rating for the business relations performance category (including a narrative for the rating);

(3) Concur with or revise the project officer's ratings after consultation with the project officer;

(4) Provide any additional information concerning the quality, cost control, and timeliness of performance categories if deemed appropriate for the evaluation or future evaluations (if any), and provide any information regarding subcontracts, key personnel, and customer satisfaction; and

(5) Forward the Report to the contractor within ten (10) business days after the contracting officer receives the project officer's evaluation.

(c) The contractor shall be granted thirty (30) business days from the date of the contractor's receipt of the Report to review and provide a response to the contracting officer regarding the contents of the Report. The contractor shall:

(1) Review the Report;

(2) Provide a response (if any) to the contracting officer on company letter head or electronically;

(3) Complete contractor representation information; and

(4) Forward the Report to the contracting officer within the designated thirty (30) business days.

(d) The contractor's response to the Report may include written comments, rebuttals (disagreements), or additional information. If the contractor does not respond to the Report within the designated thirty (30) business days, the specified ratings in the Report are deemed appropriate for the evaluation period. In this instance, the contracting officer shall complete the Agency review and sign the Report within three (3) business days after expiration of the specified 30 business days.

(e) If the contractor submits comments, rebuttals (disagreements), or additional information to the contracting officer which contests the ratings, the contracting officer, in consultation with the project officer, shall initially try to resolve the disagreement(s) with the contractor.

(f) If the disagreement(s) is (are) not resolved between the contractor and the contracting officer, the contracting officer shall provide a written recommendation to one level above the contracting officer for resolution as promptly as possible, but no later than five (5) business days after the contracting officer is made aware that the disagreement(s) has (have) not been resolved with the contractor. The individual who is one level above the contracting officer shall:

(1) Review the contracting officer's written recommendation; and

(2) Provide a written determination to the contracting officer for summary ratings (ultimate conclusion for ratings pertaining to the performance period being evaluated) within five (5) business days after the individual one level above the contracting officer receives the contracting officer's written recommendation.

(g) If the disagreement is resolved, the contracting officer shall complete the Agency review and sign the Report within three (3) business days after consultation.

(h) The contracting officer shall complete the Agency review and sign the Report within three (3) business days after the contracting officer receives a written determination for summary ratings from one level above the contracting officer.

(i) An interim or final Report is considered completed after the contracting officer signs the Report. The contracting officer must provide a copy of completed Reports (interim and final) to the contractor within two (2) business days after completion.

H.5 DATA STANDARDS FOR THE TRANSMISSION OF LABORATORY MEASUREMENT RESULTS (EPAAR 1552.211-80) (OCT 2000)

This contract requires the transmission of environmental measurements to EPA. The transmission of environmental measurements shall be in accordance with the provisions of EPA Order 2180.2, dated December 10, 1987, which is incorporated by reference in this contract. Copies of the Order may be obtained by written request to: Office of Information Resources Management, Information Management and Systems Division, Mail Code (3404), Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

H.6 UTILIZATION OF RURAL AREA SMALL BUSINESS CONCERNS (EP 52.219-110) (APR 1990)

(a) (1) "Rural area small business concern," as used in this clause, means a small business concern that is located and conducts its principal operations in a rural geographic area (county or parish) listed in the Small Business Administration's Listing of Non-Metropolitan Rural Counties by State.

(2) "Small business concern," as used in this clause, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on government contracts, and qualified as a small business under the criteria and size standard in 13 CFR 121.

(b) It is the policy of the Environmental Protection Agency (EPA) that rural area small business concerns shall have the maximum practicable opportunity to participate in performing contracts awarded by EPA.

(c) The contractor shall use its best efforts to give rural area small business concerns the opportunity to participate in the subcontracts it awards to the fullest extent consistent with efficient performance of this contract.

(d) The contractor shall incorporate the substance of this clause in any subcontract that may provide for additional subcontracting opportunities.

H.7 UTILIZATION OF HISTORICALLY BLACK COLLEGES AND UNIVERSITIES (EP 52.219-115) (JUL 1991)

(a) It is the Policy of the Environmental Protection Agency that historically black colleges and universities shall have the maximum practicable opportunity to participate in performing contracts awarded by the Agency.

(b) The Contractor shall use its best efforts to give historically black colleges and universities the opportunity to participate in any subcontracts awarded to the fullest extent consistent with efficient performance of this contract.

(c) The contractor shall incorporate the substance of this clause in any subcontract which may provide for additional subcontracting opportunities.

H.8 PROJECT EMPLOYEE CONFIDENTIALITY AGREEMENT (EPAAR 1552.227-76) (MAY 1994)

(a) The Contractor recognizes that Contractor employees in performing this contract may have access to data, either provided by the Government or first generated during contract performance, of a sensitive nature which should not be released to the public without Environmental Protection Agency (EPA) approval. Therefore, the Contractor agrees to obtain confidentiality agreements from all of its employees working on requirements under this contract.

(b) Such agreements shall contain provisions which stipulate that each employee agrees that the employee will not disclose, either in whole or in part, to any entity external to EPA, the Department of Justice, or the Contractor, any information or data (as defined in FAR Section 27.401) provided by the Government or first generated by the Contractor under this contract, any site-specific cost information, or any enforcement strategy without first obtaining the written permission of the EPA Contracting Officer. If a contractor, through an employee or otherwise, is subpoenaed to testify or produce documents, which could result in such disclosure, the Contractor must provide immediate advance notification to the EPA so that the EPA can authorize such disclosure or have the opportunity to take action to prevent such disclosure. Such agreements shall be effective for the life of the contract and for a period of five (5) years after completion of the contract.

(c) The EPA may terminate this contract for convenience, in whole or in part, if it deems such termination necessary to prevent the unauthorized disclosure of information to outside entities. If such a disclosure occurs without the written permission of the EPA Contracting Officer, the Government may terminate the contract, for default or convenience, or pursue other remedies as may be permitted by law or this contract.

(d) The Contractor further agrees to insert in any subcontract or consultant agreement placed hereunder, except for subcontracts or consultant agreements for well drilling, fence erecting, plumbing, utility hookups, security guard services, or electrical services, provisions which shall conform substantially to the language of this clause, including this paragraph, unless otherwise authorized by the Contracting Officer.

H.9 SCREENING BUSINESS INFORMATION FOR CLAIMS OF CONFIDENTIALITY (EPAAR 1552.235-70) (APR 1984)

(a) Whenever collecting information under this contract, the Contractor agrees to comply with the following requirements:

(1) If the Contractor collects information from public sources, such as books, reports, journals, periodicals, public records, or other sources that are available to the public without restriction, the Contractor shall submit a list of these sources to the appropriate program office at the time the

information is initially submitted to EPA. The Contractor shall identify the information according to source.

(2) If the Contractor collects information from a State or local Government or from a Federal agency, the Contractor shall submit a list of these sources to the appropriate program office at the time the information is initially submitted to EPA. The Contractor shall identify the information according to source.

(3) If the Contractor collects information directly from a business or from a source that represents a business or businesses, such as a trade association:

(i) Before asking for the information, the Contractor shall identify itself, explain that it is performing contractual work for the Environmental Protection Agency, identify the information that it is seeking to collect, explain what will be done with the information, and give the following notice:

(A) You may, if you desire, assert a business confidentiality claim covering part or all of the information. If you do assert a claim, the information will be disclosed by EPA only to the extent, and by means of the procedures, set forth in 40 CFR Part 2, Subpart B.

(B) If no such claim is made at the time this information is received by the Contractor, it may be made available to the public by the Environmental Protection Agency without further notice to you.

(C) The Contractor shall, in accordance with FAR Part 9, execute a written agreement regarding the limitations of the use of this information and forward a copy of the agreement to the Contracting Officer.

(ii) Upon receiving the information, the Contractor shall make a written notation that the notice set out above was given to the source, by whom, in what form, and on what date.

(iii) At the time the Contractor initially submits the information to the appropriate program office, the Contractor shall submit a list of these sources, identify the information according to source, and indicate whether the source made any confidentiality claim and the nature and extent of the claim.

(b) The Contractor shall keep all information collected from nonpublic sources confidential in accordance with the clause in this contract entitled "Treatment of Confidential Business Information" as if it had been furnished to the Contractor by EPA.

(c) The Contractor agrees to obtain the written consent of the Contracting Officer, after a written determination by the appropriate program office, prior to entering into any subcontract that will require the subcontractor to collect information. The Contractor agrees to include this clause, including this paragraph (c), and the clause entitled "Treatment of Confidential Business Information" in all subcontracts awarded pursuant to this contract that require the subcontractor to collect information.

H.10 TREATMENT OF CONFIDENTIAL BUSINESS INFORMATION (EPAAR 1552.235-71) (APR 1984)

(a) The Contracting Officer, after a written determination by the appropriate program office, may disclose confidential business information

(CBI) to the Contractor necessary to carry out the work required under this contract. The Contractor agrees to use the CBI only under the following conditions:

(1) The Contractor and Contractor's employees shall: (i) use the CBI only for the purposes of carrying out the work required by the contract; (ii) not disclose the information to anyone other than properly cleared EPA employees without the prior written approval of the Assistant General Counsel for Contracts and Information Law; and (iii) return to the Contracting Officer all copies of the information, and any abstracts or excerpts therefrom, upon request by the Contracting Officer, whenever the information is no longer required by the Contractor for the performance of the work required by the contract, or upon completion of the contract.

(2) The Contractor shall obtain a written agreement to honor the above limitations from each of the Contractor's employees who will have access to the information before the employee is allowed access.

(3) The Contractor agrees that these contract conditions concerning the use and disclosure of CBI are included for the benefit of, and shall be enforceable by, both EPA and any affected businesses having a proprietary interest in the information.

(4) The Contractor shall not use any CBI supplied by EPA or obtained during performance hereunder to compete with any business to which the CBI relates.

(b) The Contractor agrees to obtain the written consent of the CO, after a written determination by the appropriate program office, prior to entering into any subcontract that will involve the disclosure of CBI by the Contractor to the subcontractor. The Contractor agrees to include this clause, including this paragraph (b), in all subcontracts awarded pursuant to this contract that require the furnishing of CBI to the subcontractor.

H.11 RELEASE OF CONTRACTOR CONFIDENTIAL BUSINESS INFORMATION (EPAAR 1552.235-79) (APR 1996)

(a) The Environmental Protection Agency (EPA) may find it necessary to release information submitted by the Contractor either in response to this solicitation or pursuant to the provisions of this contract, to individuals not employed by EPA. Business information that is ordinarily entitled to confidential treatment under existing Agency regulations (40 C.F.R. Part 2) may be included in the information released to these individuals. Accordingly, by submission of this proposal or signature on this contract or other contracts, the Contractor hereby consents to a limited release of its confidential business information (CBI).

(b) Possible circumstances where the Agency may release the Contractor's CBI include, but are not limited to the following:

(1) To other Agency contractors tasked with assisting the Agency in the recovery of Federal funds expended pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Sec. 9607, as amended, (CERCLA or Superfund);

(2) To the U.S. Department of Justice (DOJ) and contractors employed by DOJ for use in advising the Agency and representing the Agency in procedures for the recovery of Superfund expenditures;

(3) To parties liable, or potentially liable, for costs under CERCLA Sec. 107 (42 U.S.C. Sec. 9607), et al, and their insurers (Potentially Responsible Parties) for purposes of facilitating settlement or litigation of claims against such parties;

(4) To other Agency contractors who, for purposes of performing the work required under the respective contracts, require access to information the Agency obtained under the Clean Air Act (42 U.S.C. 7401 et seq.); the Federal Water Pollution Control Act (33 U.S.C.1251 et seq.); the Safe Drinking Water Act (42 U.S.C. 300f et seq.); the Federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. 136 et seq.); the Resource Conservation and Recovery Act (42 U.S.C. 6901 et seq.); the Toxic Substances Control Act (15 U.S.C. 2601 et seq.); or the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601 et seq.);

(5) To other Agency contractors tasked with assisting the Agency in handling and processing information and documents in the administration of Agency contracts, such as providing both preaward and post award audit support and specialized technical support to the Agency's technical evaluation panels;

(6) To employees of grantees working at EPA under the Senior Environmental Employment (SEE) Program;

(7) To Speaker of the House, President of the Senate, or Chairman of a Committee or Subcommittee;

(8) To entities such as the General Accounting Office, boards of contract appeals, and the Courts in the resolution of solicitation or contract protests and disputes;

(9) To Agency contractor employees engaged in information systems analysis, development, operation, and maintenance, including performing data processing and management functions for the Agency; and

(10) Pursuant to a court order or court-supervised agreement.

(c) The Agency recognizes an obligation to protect the contractor from competitive harm that may result from the release of such information to a competitor. (See also the clauses in this document entitled "Screening Business Information for Claims of Confidentiality" and "Treatment of Confidential Business Information.") Except where otherwise provided by law, the Agency will permit the release of CBI under subparagraphs (1), (3), (4), (5), (6), or (9) only pursuant to a confidentiality agreement.

(d) With respect to contractors, 1552.235-71 will be used as the confidentiality agreement. With respect to Potentially Responsible Parties, such confidentiality agreements may permit further disclosure to other entities where necessary to further settlement or litigation of claims under CERCLA. Such entities include, but are not limited to accounting firms and technical experts able to analyze the information, provided that they also agree to be bound by an appropriate confidentiality agreement.

(e) This clause does not authorize the Agency to release the Contractor's CBI to the public pursuant to a request filed under the Freedom of Information Act.

(f) The Contractor agrees to include this clause, including this paragraph (f), in all subcontracts at all levels awarded pursuant to this contract that

require the furnishing of confidential business information by the subcontractor.

H.12 DATA SECURITY FOR FIFRA CONFIDENTIAL BUSINESS INFORMATION (EP 52.235-140) (AUG 1993)

The Contractor shall handle Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) confidential business information (CBI) in accordance with the contract clause entitled "Treatment of Confidential Business Information" and "Screening Business Information for Claims of Confidentiality," the provisions set forth below, and the Contractor's approved detailed security plan.

(a) The Project Officer (PO) or his/her designee, after a written determination by the appropriate program office, may disclose FIFRA CBI to the contractor necessary to carry out the work required under this contract. The Contractor shall protect all FIFRA CBI to which it has access (including CBI used in its computer operations) in accordance with the following requirements:

(1) The Contractor and Contractor's employees shall follow the security procedures set forth in the FIFRA Information Security Manual. The manual may be obtained from the Project Officer (PO) or the Chief, Information Services Branch (ISB), Program Management and Support Division, Office of Pesticide Programs (OPP) (H7502C), U.S. Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Washington, DC 20460.

(2) The Contractor and Contractor's employees shall follow the security procedures set forth in the Contractor's security plan(s) approved by EPA.

(3) Prior to receipt of FIFRA CBI by the Contractor, the Contractor shall submit a certification statement to the Chief of the ISB, with a copy to the Contracting Officer (CO), certifying that all employees who will be cleared for access to FIFRA CBI have been briefed on the handling, control and security requirements set forth in the FIFRA Information Security Manual.

(4) The Contractor Document Control Officer (DCO) shall obtain a signed copy of the FIFRA "Contractor Employee Confidentiality Agreement" from each of the Contractor's employees who will have access to the information before the employee is allowed access.

(b) The Contractor agrees that these requirements concerning protection of FIFRA CBI are included for the benefit of, and shall be enforceable by, both EPA and any affected business having a proprietary interest in the information.

(c) The Contractor understands that CBI obtained by EPA under FIFRA may not be disclosed except as authorized by the Act, and that any unauthorized disclosure by the Contractor or the Contractor's employees may subject the Contractor and the Contractor's employees to the criminal penalties specified in FIFRA (7 U.S.C. 136h(f)). For purposes of this contract, the only disclosures that EPA authorizes the Contractor to make are those set forth in the clause entitled "Treatment of Confidential Business Information."

(d) The Contractor agrees to include the provisions of this clause, including this paragraph (d), in all subcontracts awarded pursuant to this contract that require the furnishing of CBI to the subcontractor.

(e) At the request of EPA or at the end of the contract, the Contractor shall return to the EPA PO or his/her designee all documents, logs, and magnetic media which contain FIFRA CBI. In addition, each Contractor employee who has received FIFRA CBI clearance will sign a "Confidentiality Agreement for Contractor Employees Upon Relinquishing FIFRA CBI Access Authority". The Contractor DCO will also forward those agreements to the EPA PO or his/her designee, with a copy to the CO, at the end of the contract.

(f) If, subsequent to the date of this contract, the Government changes the security requirements, the CO shall equitably adjust affected provisions of this contract, in accordance with the "Changes" clause when:

(1) The Contractor submits a timely written request for an equitable adjustment; and

(2) The facts warrant an equitable adjustment.

H.13 TECHNICAL DIRECTION (EPAAR 1552.237-71) (APR 1984) DEVIATION

(a) The Project Officer is the primary representative of the Contracting Officer authorized to provide technical direction on contract performance.

(b) Individuals other than the Project Officer may be authorized to provide technical direction. If individuals other than the Project Officer are authorized to provide technical direction, their names will be specified in the contract, delivery order, work assignment or technical direction document as appropriate. A Delivery Order Project Officer, Work Assignment Manager or Task Manager is authorized to provide technical direction, subject to the limitations set forth below, only on his/her delivery order, work assignment or technical direction document.

(c) Technical direction includes:

(1) Direction to the contractor which assists the contractor in accomplishing the Statement of Work.

(2) Comments on and approval of reports or other deliverables.

(d) Technical direction must be within the contract and the delivery order, work assignment or technical direction document statement of work. The Project Officer or any other technical representative of the Contracting Officer does not have the authority to issue technical direction which (1) institutes additional work outside the scope of the contract, delivery order, work assignment or technical direction document; (2) constitutes a change as defined in the "Changes" clause; (3) causes an increase or decrease in the estimated cost of the contract, delivery order, work assignment or technical direction document; (4) alters the period of performance; or (5) changes any of the other express terms or conditions of the contract, delivery order, work assignment or technical direction document.

(e) Technical direction will be issued in writing or confirmed in writing within five (5) calendar days after verbal issuance. One copy of the technical direction memorandum will be forwarded to the Contracting Officer and the Project Officer.

H.14 PAPERWORK REDUCTION ACT (EPAAR 1552.237-75) (APR 1984)

If it is established at award or subsequently becomes a contractual

requirement to collect identical information from ten (10) or more public respondents, the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 et seq. applies. In that event, the Contractor shall not take any action to solicit information from any of the public respondents until notified in writing by the Contracting Officer that the required Office of Management and Budget (OMB) final clearance was received.

H.15 SUBCONTRACTING NOT ALLOWED

Subcontracting of any tasks required by the Statement of Work is not allowed.

H.16 NOTICE CONCERNING FALSE REPRESENTATION OF EPA ENDORSEMENT

Neither the award of a contract nor the successful analysis of blind performance evaluation samples (PES) during the contract performance constitutes a certification, accreditation, or endorsement of the Contractor's laboratory by the U.S. Environmental Protection Agency. Allegations of unfair or deceptive advertisements which claim Agency endorsement will be referred to the Federal Trade Commission for action pursuant to Section 6(f) of the Federal Trade Commission Act, 15 U.S.C. 46. The Federal Trade Commission has statutory authority to investigate alleged violations of federal law prohibiting unfair methods of competition and to settle such matters through the issuance of consent orders to cease and desist. Federal Trade Commission regulations concerning such matters may be found at 16 CFR, Part 2.

H.17 TASK-ORDER AND DELIVERY-ORDER OMBUDSMAN (EP-S 00-02) (SEP 2000)

The Task-Order and Delivery-Order Ombudsman for this contract is:

Name:	Corinne M. Sisneros
Address:	1200 Pennsylvania Avenue, N.W. 3801R Washington, D.C. 20460
Telephone Number:	(202) 564-4321
Facsimile Number:	(202) 565-2473
E-Mail Address:	<sisneros.corinne@epa.gov>

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 NOTICE Listing Contract Clauses Incorporated by Reference

NOTICE:

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

NUMBER	DATE	TITLE
52.202-1	OCT 1995	DEFINITIONS
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.203-6	JUL 1995	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT
52.203-7	JUL 1995	ANTI-KICKBACK PROCEDURES
52.203-10	JAN 1997	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-12	JUN 1997	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS
52.204-4	AUG 2000	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER
52.209-6	JUL 1995	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT
52.215-2	JUN 1999	AUDIT AND RECORDS--NEGOTIATION
52.215-11	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA--MODIFICATIONS
52.215-13	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA--MODIFICATIONS
52.215-15	DEC 1998	PENSION ADJUSTMENT AND ASSET REVERSIONS
52.215-17	OCT 1997	WAIVER OF FACILITIES CAPITAL COST OF MONEY
52.219-4	JAN 1999	NOTICE OF PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS
52.219-8	OCT 2000	UTILIZATION OF SMALL BUSINESS CONCERNS
52.222-3	AUG 1996	CONVICT LABOR
52.222-26	FEB 1999	EQUAL OPPORTUNITY
52.222-35	APR 1998	AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA
52.222-36	JUN 1998	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES
52.222-37	JAN 1999	EMPLOYMENT REPORTS ON DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA
52.222-41	MAY 1989	SERVICE CONTRACT ACT OF 1965, AS AMENDED
52.222-43	MAY 1989	FAIR LABOR STANDARDS ACT AND SERVICE CONTRACT ACT - PRICE ADJUSTMENT (MULTIPLE YEAR AND OPTION CONTRACTS)
52.223-6	JAN 1997	DRUG-FREE WORKPLACE

52.223-14	OCT 2000	TOXIC CHEMICAL RELEASE REPORTING
52.225-13	JUL 2000	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES
52.227-1	JUL 1995	AUTHORIZATION AND CONSENT
52.227-2	AUG 1996	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-14	JUN 1987	RIGHTS IN DATA--GENERAL
52.227-14	JUN 1987	RIGHTS IN DATA--GENERAL ALTERNATE II (JUN 1987)
52.227-14	JUN 1987	RIGHTS IN DATA--GENERAL ALTERNATE III (JUN 1987)
52.227-16	JUN 1987	ADDITIONAL DATA REQUIREMENTS
52.227-17	JUN 1987	RIGHTS IN DATA--SPECIAL WORKS
52.229-3	JAN 1991	FEDERAL, STATE, AND LOCAL TAXES
52.229-5	APR 1984	TAXES--CONTRACTS PERFORMED IN U.S. POSSESSIONS OR PUERTO RICO
52.232-1	APR 1984	PAYMENTS
52.232-8	MAY 1997	DISCOUNTS FOR PROMPT PAYMENT
52.232-11	APR 1984	EXTRAS
52.232-17	JUN 1996	INTEREST
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.232-25	JUN 1997	PROMPT PAYMENT
52.232-34	MAY 1999	PAYMENT BY ELECTRONIC FUNDS TRANSFER--OTHER THAN CENTRAL CONTRACTOR REGISTRATION
52.233-1	DEC 1998	DISPUTES ALTERNATE I (DEC 1991)
52.233-3	AUG 1996	PROTEST AFTER AWARD
52.237-3	JAN 1991	CONTINUITY OF SERVICES
52.242-13	JUL 1995	BANKRUPTCY
52.243-1	AUG 1987	CHANGES--FIXED-PRICE
52.243-1	AUG 1987	CHANGES--FIXED-PRICE ALTERNATE I (APR 1984)
52.246-25	FEB 1997	LIMITATION OF LIABILITY--SERVICES
52.249-4	APR 1984	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (SERVICES) (SHORT FORM)
52.249-8	APR 1984	DEFAULT (FIXED-PRICE SUPPLY AND SERVICE)
52.253-1	JAN 1991	COMPUTER GENERATED FORMS

I.2 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (FAR 52.203-8) (JAN 1997)

(a) If the Government receives information that a contractor or a person has engaged in conduct constituting a violation of subsection (a),(b),(c), or (d) of Section 27 of the Office of Federal Procurement Policy Act (41 U.S.C 423)(the Act), as amended by section 4304 of the 1996 National Defense Authorization Act for Fiscal Year 1996 (Pub.L. 104-106), the Government may--

(1)Cancel the solicitation, if the contract has not yet been awarded or issued; or

(2)Rescind the contract with respect to which--

(i)The Contractor or someone acting for the Contractor has been convicted for an offense where the conduct constitutes a violation of subsection 27(a) or (b) of the Act for the purpose of either-

(A)Exchanging the information covered by such subsections for anything of value; or

(B)Obtaining or giving anyone a competitive advantage in the award of a Federal agency procurement contract; or

(ii)The head of the contracting activity has determined, based upon a preponderance of the evidence, that the Contractor or someone acting for the Contractor has engaged in conduct constituting an offense punishable under subsections 27(e)(1) of the Act.

(b) If the Government rescinds the contract under paragraph (a) of this clause, the government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.
(c) The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law, regulation, or under this contract.

I.3 PRINTING/COPYING DOUBLE-SIDED ON RECYCLED PAPER (FAR 52.204-4) (JUN 1996) DEVIATION

(a) In accordance with Executive Order 12873, dated October 20, 1993, as amended by Executive Order 12995, dated March 25, 1996, the Offeror/Contractor is required to submit paper documents, such as offers, letters, or reports, that are printed/copied double-sided on recycled paper that has at least 20% postconsumer material.

(b) The 20% standard applies to high-speed copier paper, offset paper, forms bond, computer printout paper, carbonless paper, file folders, white woven envelopes, and other uncoated printed and writing paper, such as writing and office paper, book paper, cotton fiber paper, and cover stock. An alternative standard to meeting the 20% postconsumer material standard is 50% recovered material content of certain industrial by-products.

I.4 QUALIFICATION REQUIREMENTS (FAR 52.209-1) (FEB 1995)

(a) Definition: "Qualification Requirement," as used in this clause, means a Government requirement for testing or other quality assurance demonstration that must be completed before award.

(b) One or more qualification requirements apply to the supplies or services covered by this contract. For those supplies or services requiring qualification, whether the covered product or service is an end item under this contract or simply a component of an end item, the product, manufacturer, or source must have demonstrated that it meets the standards prescribed for qualification before award of this contract. The product, manufacturer, or source must be qualified at the time of award whether or not the name of the product, manufacturer, or source is actually included on a qualified products list, qualified manufacturers list, or qualified bidders list. Offerors should contact the agency activity designated below to obtain all requirements that they or their products or services, or their subcontractors or their products or services, must satisfy to become qualified and to arrange for an opportunity to demonstrate their abilities to meet the standards specified for qualification.

Barbara H. Stearrett
U.S. Environmental Protection Agency
Office of Acquisition Management/SRRPOD (3805R)
1200 Pennsylvania Ave, NW
Washington, DC 20460

(c) If an offeror, manufacturer, source, product or service covered by a qualification requirement has already met the standards specified, the relevant information noted below should be provided.

Offeror's Name _____

Date of On-Site Laboratory Audit _____
(to the extent known)

(d) Even though a product or service subject to a qualification requirement is not itself an end item under this contract, the product, manufacturer, or source must nevertheless be qualified at the time of award of this contract. This is necessary whether the Contractor or subcontractor will ultimately provide the product or service in question. If, after award, the Contracting Officer discovers that an applicable qualification requirement was not in fact met at the time of award, the Contracting Officer may either terminate this contract for default or allow performance to continue if adequate consideration is offered and the action is determined to be otherwise in the Government's best interests.

(e) If an offeror, manufacturer, source, product, or service has met the qualification requirement but is not yet on a qualified products list, qualified manufacturers list, or qualified bidders list, the offeror must submit evidence of qualification prior to award of this contract. Unless determined to be in the Government's interest, award of this contract shall not be delayed to permit an offeror to submit evidence of qualification.

(f) Any change in location or ownership of the plant where a previously qualified product or service was manufactured or performed requires reevaluation of the qualification. Similarly, any change in location or ownership of a previously qualified manufacturer or source requires reevaluation of the qualification. The reevaluation must be accomplished before the date of award.

I.5 NOTIFICATION OF OWNERSHIP CHANGES (FAR 52.215-19) (OCT 1997)

(a) The Contractor shall make the following notifications in writing:

(1) When the Contractor becomes aware that a change in its ownership has occurred, or is certain to occur, that could result in changes in the valuation of its capitalized assets in the accounting records, the Contractor shall notify the Administrative Contracting Officer (ACO) within 30 days.

(2) The Contractor shall also notify the ACO within 30 days whenever changes to asset valuations or any other cost changes have occurred or are certain to occur as a result of a change in ownership.

(b) The Contractor shall--

(1) Maintain current, accurate, and complete inventory records of assets and their costs;

(2) Provide the ACO or designated representative ready access to the records upon request;

(3) Ensure that all individual and grouped assets, their capitalized values, accumulated depreciation or amortization, and remaining useful lives are identified accurately before and after each of the Contractor's ownership changes; and

(4) Retain and continue to maintain depreciation and amortization schedules based on the asset records maintained before each Contractor ownership change.

(c) The Contractor shall include the substance of this clause in all subcontracts under this contract that meet the applicability requirement of FAR 15.408(k).

I.6 ORDERING (FAR 52.216-18) (OCT 1995)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from contract effective date through 36 months after contract effective date.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

I.7 ORDER LIMITATIONS (FAR 52.216-19) (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than $250, the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor--

(1) Any order for a single item in excess of the contract minimum for a unilateral order or the contract maximum for a bilateral order;

(2) Any order for a combination of items in excess of the contract minimum for a unilateral order or the contract maximum for a bilateral order;

(3) A series of orders from the same ordering office within the contract ordering period that together call for quantities exceeding the limitation in subparagraph (1) or (2) above.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) above.

(d) Notwithstanding paragraphs (b) and (c) above, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within ten (10) days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

I.8 INDEFINITE QUANTITY (FAR 52.216-22) (OCT 1995)

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The

quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum." The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after one (1) year beyond the expiration date of the contract.

I.9 NOTICE OF PRICE EVALUATION ADJUSTMENT FOR SMALL DISADVANTAGED BUSINESS CONCERNS (FAR 52.219-23) (OCT 1998) ALTERNATE I (OCT 1998)

(a) *Definitions.* As used in this clause--

"Small disadvantaged business concern" means an offeror that represents, as part of its offer, that it is a small business under the size standard applicable to this acquisition; and either--

(1) It has received certification by the Small Business Administration as a small disadvantaged business concern consistent with 13 CFR 124, Subpart B; and

(i) No material change in disadvantaged ownership and control has occurred since its certification;

(ii) Where the concern is owned by one or more disadvantaged individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(iii) It is identified, on the date of its representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration (PRO-Net).

(2) It has submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted. In this case, in order to receive the benefit of a price evaluation adjustment, an offeror must receive certification as a small disadvantaged business concern by the Small Business Administration prior to contract award; or

(3) Is a joint venture as defined in 13 CFR 124.1002(f).

"Historically black college or university" means an institution determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. For the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and the Coast Guard, the term also includes any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

"Minority institution" means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1135d-5(3)) which, for purposes of this clause, includes a Hispanic-serving institution of higher education as defined in Section 316(b)(1) of the Act (20 U.S.C. 1059c(b)(1)).

"United States" means the United States, its territories and possessions, the Commonwealth of Puerto Rico, the U.S. Trust Territory of the Pacific Islands, and the District of Columbia.

(b) *Evaluation adjustment.* (1) The Contracting Officer will evaluate offers by adding a factor of ten (10) percent to the price of all offers, except--

(i) Offers from small disadvantaged business concerns that have not waived the adjustment;

(ii) An otherwise successful offer of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is equaled or exceeded (see section 25.402 of the Federal Acquisition Regulation (FAR));

(iii) An otherwise successful offer where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government;

(iv) For DoD, NASA, and Coast Guard acquisitions, an otherwise successful offer from a historically black college or university or minority institution; and

(v) For DoD acquisitions, an otherwise successful offer of qualifying country end products (see sections 225.000-70 and 252.225-7001 of the Defense FAR Supplement).

(2) The Contracting Officer will apply the factor to a line item or a group of line items on which award may be made. The Contracting Officer will apply other evaluation factors described in the solicitation before application of the factor. The factor may not be applied if using the adjustment would cause the contract award to be made at a price that exceeds the fair market price by more than the factor in paragraph (b)(1) of this clause.

(c) *Waiver of evaluation adjustment.* A small disadvantaged business concern may elect to waive the adjustment, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply to offers that waive the adjustment.

____Offeror elects to waive the adjustment.

(d) *Agreements.* (1) A small disadvantaged business concern, that did not

waive the adjustment, agrees that in performance of the contract, in the case of a contract for--

(i) Services, except construction, at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern;

(ii) Supplies (other than procurement from a non-manufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern;

(iii) General construction, at least 15 percent of the cost of the contract, excluding the cost of materials, will be performed by employees of the concern; or

(iv) Construction by special trade contractors, at least 25 percent of the cost of the contract, excluding the cost of materials, will be performed by employees of the concern.

(2) A small disadvantaged business concern submitting an offer in its own name agrees to furnish in performing this contract only end items manufactured or produced by small business concerns in the United States. This paragraph does not apply in connection with construction or service contracts.

I.10 STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES (FAR 52.222-42) (MAY 1989)

In compliance with the Service Contract Act of 1965, as amended, and the regulations of the Secretary of Labor (29 CFR Part 4), this clause identifies the classes of service employees expected to be employed under the contract and states the wages and fringe benefits payable to each if they were employed by the contracting agency subject to the provisions of 5 U.S.C. 5341 or 5332.

THIS STATEMENT IS FOR INFORMATION ONLY: IT IS NOT A WAGE DETERMINATION.

Employee Class	Monetary Wage- Fringe Benefits
Laboratory Technician (29210)	$29,852 per year + 36% fringe benefit

I.11 SERVICE CONTRACT ACT - PLACE OF PERFORMANCE UNKNOWN (FAR 52.222-49) (MAY 1989)

(a) This contract is subject to the Service Contract Act, and the place of performance was unknown when the solicitation was issued. In addition to places or areas identified in wage determinations, if any, attached to the solicitation, wage determinations have also been requested for the following: _None__. The Contracting Officer will request wage determinations for additional places or areas of performance if asked to do so in writing by 4:30 pm ET of the 15th day after solicitation issuance.

(b) Offerors who intend to perform in a place or area of performance for which a wage determination has not been attached or requested may nevertheless submit bids or proposals. However, a wage determination shall be requested and incorporated in the resultant contract retroactive to the date of contract award, and there shall be no adjustment in the contract price.

I.12 SUBCONTRACTS FOR COMMERCIAL ITEMS AND COMMERCIAL COMPONENTS (FAR

52.244-6) (OCT 1998)

(a) Definition.

"Commercial item", as used in this clause, has the meaning contained in the clause at 52.202-1, Definitions.

"Subcontract", as used in this clause, includes a transfer of commercial items between divisions, subsidiaries, or affiliates of the Contractor or subcontractor at any tier.

(b) To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial items or nondevelopmental items as components of items to be supplied under this contract.

(c) Notwithstanding any other clause of this contract, the Contractor is not required to include any FAR provision or clause, other than those listed below to the extent they are applicable and as may be required to establish the reasonableness of prices under Part 15, in a subcontract at any tier for commercial items or commercial components:

(1) 52.222-26, Equal Opportunity (E.O. 11246);

(2) 52.222-35, Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era (38 U.S.C. 4212(a));

(3) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C. 793); and

(4) 52.247-64, Preference for Privately Owned U.S.-Flagged Commercial Vessels (46 U.S.C. 1241) (flow down not required for subcontracts awarded beginning May 1, 1996).

(d) The Contractor shall include the terms of this clause, including this paragraph (d), in subcontracts awarded under this contract.

I.13 CLAUSES INCORPORATED BY REFERENCE (FAR 52.252-2) (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/

http://www.epa.gov/oam

I.14 AUTHORIZED DEVIATIONS IN CLAUSES (FAR 52.252-6) (APR 1984)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "DEVIATION" after the date of the clause.

(b) The use in this solicitation or contract of any Environmental Protection Agency (48 CFR Chapter 15) clause with an authorized deviation is indicated by

the addition of "DEVIATION" after the name of the regulation.

PART III - LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

SECTION J - LIST OF ATTACHMENTS

J.1 LIST OF ATTACHMENTS (EP 52.252-100) (APR 1984)

Number	Attachment Title
1	SOW - Exhibit A - Summary of Requirements - Analysis of CDD's and CDF's
2	SOW- Exhibit B - Reporting and Deliverables Requirements
3	SOW - Exhibit C - Target Compound List & Contract Required Quantitation Limits
4	SOW - Exhibit D - Analytical Methods
5	SOW- Exhibit E - Quality Assurance/Quality Control Procedures and Requirements
6	SOW- Exhibit F - Chain-Of-Custody, Document Control, and Written Standard Operating Procedures
7	SOW- Exhibit G - Glossary of Terms
8	SOW- Exhibit H - Data Dictionary and Format for Data Deliverables in Computer-Readable Format
9	WAGE DETERMINATION No. 94-2433 Rev. 20, dtd 7/5/01, OK, TULSA
10	WAGE DETERMINATION No. 94-2058 Rev. 22, dtd 8/13/01, CA, SAN DIEGO
11	CLIENT AUTHORIZATION LETTER - PAST PERFORMANCE QUESTIONNAIRE

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION K - REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFERORS

K.1 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (FAR 52.203-2) (APR 1985)

(a) The offeror certifies that--

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory--

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2)(i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above

_____
_____
_____

[Insert full name of person(s) in the offeror's organization responsible for determining the prices offered in the bid or proposal, and the title of his or her position in the offeror's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

K.2 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (FAR 52.203-11) (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989--

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit OMB standard form LLL, Disclosure of Lobbying Activities to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

K.3 TAXPAYER IDENTIFICATION (FAR 52.204-3) (OCT 1998)

(a) *Definitions.*

"Common parent," as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Taxpayer Identification Number (TIN)," as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) *Taxpayer Identification Number (TIN).*

[ ] TIN:_____

[ ] TIN has been applied for.

[ ] TIN is not required because:

[ ] Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and
does not have an office or place of business or a fiscal paying agent in the United States;

[ ] Offeror is an agency or instrumentality of a foreign government;

[ ] Offeror is an agency or instrumentality of the Federal Government.

(e) *Type of organization.*

[ ] Sole proprietorship;

[ ] Partnership;

[ ] Corporate entity (not tax-exempt);

[ ] Corporate entity (tax-exempt);

[ ] Government entity (Federal, State, or local);

[ ] Foreign government;

[ ] International organization per 26 CFR 1.6049-4;

[ ] Other_____.

(f) *Common parent.*

[ ] Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

[ ] Name and TIN of common parent:

Name_____

TIN_____

K.4 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (FAR 52.204-5) (MAY 1999)

(a) *Definition.* "Women-owned business concern," as used in this provision, means a concern that is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) *Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.]* The offeror represents that it [ ] is, [ ] is not a women-owned business concern.

K.5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (FAR 52.209-5) (APR 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that -

(i) The Offeror and/or any of its Principals -

(A) Are [ ] are not [ ] presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have [ ] have not [ ], within a 3-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; **[This language stayed indefinitely. Please use paragraph (a)(1)(i)(D) below.]**

(C) Are [ ] are not [ ] presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision. **[This language stayed indefinitely. Please use paragraph (a)(1)(i)(E) below.]**

(D) Have [ ] have not [ ], within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft,

forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(E) Are [ ] are not [ ] presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(D) of this provision.

(ii) (A) **[This paragraph (a)(1)(ii) is stayed indefinitely.]** The offeror, aside from the offenses enumerated in paragraphs (a)(1)(i)(A), (B), and (C) of this provision, has * has not * within the past three years, relative to tax, labor and employment, environmental, antitrust, or consumer protection laws--

(1) Been convicted of a Federal or State felony (or has any Federal or State felony indictments currently pending against them); or

(2) Had a Federal court judgment in a civil case brought by the United States rendered against them; or

(3) Had an adverse decision by a Federal administrative law judge, board, or commission indicating a willful violation of law.

(B) If the offeror has responded affirmatively, the offeror shall provide additional information if requested by the Contracting Officer; and

(iii) The Offeror has [ ] has not [ ], within a 3-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

K.6 PLACE OF PERFORMANCE (FAR 52.215-6) (OCT 1997)

(a) The offeror or respondent, in the performance of any contract resulting from this solicitation, ☐ intends, ☐ does not intend [check applicable block] to use one or more plants or facilities located at a different address from the address of the offeror or respondent as indicated in this proposal or response to request for information.

(b) If the offeror or respondent checks "intends" in paragraph (a) of this provision, it shall insert in the following spaces the required information:

Place of Performance (Street Address, City, State, County, Zip Code)	Name and Address of Owner and Operator of the Plant or Facility if Other than Offeror or Respondent
_____	_____
_____	_____

K.7 SMALL BUSINESS PROGRAM REPRESENTATIONS (FAR 52.219-1) (MAR 2001) ALTERNATE I (OCT 2000)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 325188 All Other Basic Inorganic Chemical Manufacturing.

(2) The small business size standard is (insert size standard).

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) *Representations*. (1) The offeror represents as part of its offer that it [ ]is, [ ]is not a small business concern.

(2) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents, for general statistical purposes, that it [ ]is, [ ]is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents as part of its offer that it [ ]is, [ ]is not a women-owned small business concern.

(4) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents as part of its offer that it is, is not a veteran-owned small business concern.

(5) *[Complete only if the offeror represented itself as a veteran-owned*

small business concern in paragraph (b)(4) of this provision.] The offeror represents as part of its offer that it is, is not a service-disabled veteran-owned small business concern.

(6) *[Complete only if offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents, as part of its offer, that--

(i) It [ ]is, [ ]is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR Part 126; and

(ii) It [ ]is, [ ]is not a joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. [*The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture:* _____.] Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(c) *Definitions*. As used in this provision--

"Service-disabled veteran-owned small business concern"--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

"Veteran-owned small business concern" means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern--

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) *Notice*. (1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section
8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

K.8 SMALL DISADVANTAGED BUSINESS STATUS (FAR 52.219-22) (OCT 1999)

(a) *General.* This provision is used to assess an offeror's small disadvantaged business status for the purpose of obtaining a benefit on this solicitation. Status as a small business and status as a small disadvantaged business for general statistical purposes is covered by the provision at FAR 52.219-1, Small Business Program Representation.

(b) *Representations.(1) General.* The offeror represents, as part of its offer, that it is a small business under the size standard applicable to this acquisition; and either--

[ ] (i) It has received certification by the Small Business Administration as a small disadvantaged business concern consistent with 13 CFR 124, Subpart B; and

(A) No material change in disadvantaged ownership and control has occurred since its certification;

(B) Where the concern is owned by one or more disadvantaged individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(C) It is identified, on the date of its representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration (PRO-Net); or

[ ] (ii) It has submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(2) [ ] *For Joint Ventures.* The offeror represents, as part of its offer, that it is a joint venture that complies with the requirements at 13 CFR 124.1002(f) and that the representation in paragraph (b)(1) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. *[The offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: _____.]*

(c) *Penalties and Remedies.* Anyone who misrepresents any aspects of the disadvantaged status of a concern for the purposes of securing a contract or subcontract shall:

(1) Be punished by imposition of a fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under the authority of the Small Business Act.

K.9 PROHIBITION OF SEGREGATED FACILITIES (FAR 52.222-21) (FEB 1999)

(a) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(b) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

K.10 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FAR 52.222-22) (FEB 1999)

The offeror represents that--

(a) It [ ] has, [ ] has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(b) It [ ] has, [ ] has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

K.11 AFFIRMATIVE ACTION COMPLIANCE (FAR 52.222-25) (APR 1984)

The offeror represents that--

(a) It [ ] has developed and has on file, [ ] has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (b) It [ ] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

K.12 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (FAR 52.223-13) (OCT 2000)

(a) Submission of this certification is a prerequisite for making or entering into this contract imposed by Executive Order 12969, August 8, 1995.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023)and section 6607 of the Pollution Prevention Act of 1990(PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: *[Check each block that is applicable.]*

[] (i)The facility does not manufacture, process, or otherwise use any toxic chemicals listed under section 313(c) of EPCRA, 42 U.S.C. 11023(c);

[] (ii)The facility does not have 10 or more full-time employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

[] (iii)The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f)(including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

[] (iv) The facility does not fall within Standard Industrial Classification Code (SIC) major groups 20 through 39 or their corresponding North American Industry Classification System (NAICS) sectors 31 through 33; or

[] (v) The facility is not located within any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, or any other territory or possession over which the United States has jurisdiction.

K.13 COST ACCOUNTING STANDARDS NOTICES AND CERTIFICATION (FAR 52.230-1) (JUN 2000)

Note: This notice does not apply to small businesses or foreign governments. This notice is in three parts, identified by Roman numerals I through III.

Offerors shall examine each part and provide the requested information in order to determine Cost Accounting Standards (CAS) requirements applicable to any resultant contract.

If the offeror is an educational institution, Part II does not apply unless the contemplated contract will be subject to full or modified CAS coverage pursuant to 48 CFR 9903.201-2(c)(5) or 9903.201-2(c)(6), respectively.

I. DISCLOSURE STATEMENT -- COST ACCOUNTING PRACTICES AND CERTIFICATION

(a) Any contract in excess of $500,000 resulting from this solicitation will be subject to the requirements of the Cost Accounting Standards Board (48 CFR Chapter 99), except for those contracts which are exempt as specified in 48 CFR 9903.201-1.

(b) Any offeror submitting a proposal which, if accepted, will result in a contract subject to the requirements of 48 CFR Chapter 99 must, as a condition of contracting, submit a Disclosure Statement as required by 48 CFR 9903.202. When required, the Disclosure Statement must be submitted as a part of the offeror's proposal under this solicitation unless the offeror has already submitted a Disclosure Statement disclosing the practices used in connection with the pricing of this proposal. If an applicable Disclosure Statement has already been submitted, the offeror may satisfy the requirement for submission by providing the information requested in paragraph (c) of Part I of this provision.

CAUTION: In the absence of specific regulations or agreement, a practice disclosed in a Disclosure Statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or agreed- to practice for pricing proposals or accumulating and reporting contract performance cost data.

(c) Check the appropriate box below:

|__| (1) Certificate of Concurrent Submission of Disclosure Statement.

The offeror hereby certifies that, as a part of the offer, copies of the Disclosure Statement have been submitted as follows: (i) original and one copy to the cognizant Administrative Contracting Officer (ACO) or cognizant Federal agency official authorized to act in that capacity (Federal official), as applicable, and (ii) one copy to the cognizant Federal auditor.

(Disclosure must be on Form No. CASB DS-1 or CASB DS-2, as applicable. Forms may be obtained from the cognizant ACO or Federal Official and/or from the looseleaf version of the Federal Acquisition Regulation.)

Date of Disclosure Statement: _____
Name and Address of Cognizant ACO or Federal Official Where Filed:

_____

_____

_____

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement.

|__| (2) Certificate of Previously Submitted Disclosure Statement.

The offeror hereby certifies that Disclosure Statement was filed as follows:

Date of Disclosure Statement: _____
Name and Address of Cognizant ACO or Federal Official Where Filed:

_____

_____

_____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the applicable disclosure statement.

|__| (3) Certificate of Monetary Exemption.

The offeror hereby certifies that the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated prime contracts and subcontracts subject to CAS totaling $50 million or more in the cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

|__| (4) Certificate of Interim Exemption.

The offeror hereby certifies that (i) the offeror first exceeded the monetary exemption for disclosure, as defined in (3) of this subsection, in the cost accounting period immediately preceding the period in which this offer was submitted and (ii) in accordance with 48 CFR 9903.202-1, the offeror is not yet required to submit a Disclosure Statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, the offeror will immediately submit a revised certificate to the Contracting Officer, in the form specified under subparagraph (c)(1) or (c)(2) of Part I of this provision, as appropriate, to verify submission of a completed Disclosure Statement.

CAUTION: Offerors currently required to disclose because they were awarded a CAS-covered prime contract or subcontract of $50 million or more in the current cost accounting period may not claim this exemption (4). Further, the exemption applies only in connection with proposals submitted before expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

II. COST ACCOUNTING STANDARDS -- ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 48 CFR

9903.201-2(b) and elects to do so, the offeror shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

|__| The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 48 CFR 9903.201-2(b) and certifies that the offeror is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because during the cost accounting period immediately preceding the period in which this proposal was submitted, the offeror received less than $50 million in awards of CAS-covered prime contracts and subcontracts. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

CAUTION: An offeror may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a CAS-covered contract of $50 million or more or if, during its current cost accounting period, the offeror has been awarded a single CAS-covered prime contract or subcontract of $50 million or more.

III. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS

The offeror shall indicate below whether award of the contemplated contract would, in accordance with subparagraph (a)(3) of the Cost Accounting Standards clause, require a change in established cost accounting practices affecting existing contracts and subcontracts.

|__| YES |__| NO

K.14 BUSINESS OWNERSHIP REPRESENTATION (EPAAR 1552.204-70) (JAN 2001)

The successful awardee should check one or more of the categories below that represents its business ownership and return this information to the contracting officer within ten (10) calendar days after award. Completion of this clause by the successful awardee is voluntary.

"*Ownership*," as used in this clause, means: (a) At least 51 percent of the concern is owned by one or more individuals from a category listed below; or, in the case of any publicly owned business, at least 51 percent of the stock of the concern is owned by one or more such individuals; and (b) The management and daily business operations of the concern are controlled by one or more such individuals.

Ethnicity

[ ] Hispanic or Latino.
[ ] Not Hispanic or Latino.

Race

[ ] American Indian, Eskimo, or Aleut.
[ ] Asian or Pacific Islander.
[ ] Black or African American.
[ ] White.

K.15 ORGANIZATIONAL CONFLICT OF INTEREST CERTIFICATION (EPAAR 1552.209-72)

(APR 1984)

The offeror [ ] is [ ] is not aware of any information bearing on the existence of any potential organizational conflict of interest. If the offeror is aware of information bearing on whether a potential conflict may exist, the offeror shall provide a disclosure statement describing this information. (See Section L of the solicitation for further information.)

K.16 SOCIAL SECURITY NUMBERS OF CONSULTANTS AND CERTAIN SOLE PROPRIETORS AND PRIVACY ACT STATEMENT (EPAAR 1552.224-70) (APR 1984)

(a) Section 6041 of Title 26 of the U.S. Code requires EPA to file Internal Revenue Service (IRS) Form 1099 with respect to individuals who receive payments from EPA under purchase orders or contracts. Section 6109 of Title 26 of the U.S. Code authorizes collection by EPA of the social security numbers of such individuals for the purpose of filing IRS Form 1099. Social security numbers obtained for this purpose will be used by EPA for the sole purpose of filing IRS Form 1099 in compliance with Section 6041 of Title 26 of the U.S. Code.

(b) If the offeror or quoter is an individual, consultant, or sole proprietor and has no Employer Identification Number, insert the offeror's or quoter's social security number on the following line.

.....

K.17 SIGNATURE BLOCK (EP 52.299-900) (APR 1984)

I hereby certify that the responses to the above Representations, Certifications and other statements are accurate and complete.

Signature:_____

Title :_____

Date :_____

K.18 COMPLIANCE WITH VETERANS EMPLOYMENT REPORTING REQUIREMENTS (EP-S 99-1) (FEB 1999) DEVIATION

(a) The Offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (i.e. the VETS-100 report required by the Federal Acquisition Regulation clause 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era), it has[ ], has not [ ] submitted the most recent report required by 38 U.S.C. 4212(d).

(b) An Offeror who checks “has not” may not be awarded a contract until the required reports are filed. (31 U.S.C. 1354)

SECTION L - INSTRUCTIONS, CONDITIONS, AND NOTICES TO OFFERORS

L.1 NOTICE Listing Contract Clauses Incorporated by Reference

NOTICE:

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

NUMBER	DATE	TITLE
52.204-6	SEP 1999	DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER
52.215-1	FEB 2000	INSTRUCTIONS TO OFFERORS-COMPETITIVE ACQUISITION

L.2 FACILITIES CAPITAL COST OF MONEY (FAR 52.215-16) (OCT 1997)

(a) Facilities capital cost of money will be an allowable cost under the contemplated contract, if the criteria for allowability in subparagraph 31.205-10(a)(2) of the Federal Acquisition Regulation are met. One of the allowability criteria requires the prospective contractor to propose facilities capital cost of money in its offer.

(b) If the prospective Contractor does not propose this cost, the resulting contract will include the clause Waiver of Facilities Capital Cost of Money.

L.3 TYPE OF CONTRACT (FAR 52.216-1) (APR 1984) DEVIATION

The Government contemplates award of multiple Indefinite Delivery/Indefinite Quantity contracts with Firm-Fixed-Pricing resulting from this solicitation.

L.4 MULTIPLE AWARDS

The Government intends to award multiple task order contracts for the same or similar supplies or services to two or more sources under this solicitation.

L.5 SERVICE OF PROTEST (FAR 52.233-2) (AUG 1996)

(a) Protests, as defined in Section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO) shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgement of receipt from:

Barbara Stearrett

Hand-Carried Address:

Environmental Protection Agency
Ronald Reagan Building, 6th Floor, Room 61161
1300 Pennsylvania Avenue, N.W.
Washington, DC, DC 20004

Mailing Address:

Environmental Protection Agency
Aerial Rios Building, (3805R)
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

L.6 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FAR 52.252-1) (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/

http://www.epa.gov/oam

L.7 ORGANIZATIONAL CONFLICT OF INTEREST NOTIFICATION (EPAAR 1552.209-70) (APR 1984)

(a) The prospective Contractor certifies, to the best of its knowledge and belief, that it is not aware of any information bearing on the existence of any potential organizational conflict of interest. If the prospective Contractor cannot so certify, it shall provide a disclosure statement in its proposal which describes all relevant information concerning any past, present, or planned interests bearing on whether it (including its chief executives and directors, or any proposed consultant or subcontractor) may have a potential organizational conflict of interest.

(b) Prospective Contractors should refer to FAR Subpart 9.5 and EPAAR Part 1509 for policies and procedures for avoiding, neutralizing, or mitigating organizational conflicts of interest.

(c) If the Contracting Officer determines that a potential conflict exists, the prospective Contractor shall not receive an award unless the conflict can be avoided or otherwise resolved through the inclusion of a special contract clause or other appropriate means. The terms of any special clause are subject

to negotiation.

L.8 PROPOSED CONTRACT START DATE (EP 52.212-170) (AUG 1984)

For proposal preparation purposes, offerors may assume a contract start date of October 19, 2001.

L.9 SPECIAL INSTRUCTIONS TO OFFERORS

1. TECHNICAL INSTRUCTIONS

Technical capability will be determined through Pre-Award Qualification Requirements consisting of three (3)Phases: Standard Operating Procedure (SOP) Review; Performance Evaluation Sample (PES) Analysis; and, Laboratory Inspection.

Phase 1: The SOP Review requires vendors to submit to the Contracting Officer a copy of each SOPs delineated in Exhibit E, Section 5.3 of the Statement of Work (SOW). The Agency will review the SOPs for sufficiency in accordance with Exhibit E, Section 5.2. Satisfactory SOPs are those, that for the most part, are: (a) written in the format described in Section 5.2, (b) describe in detail the operations outlined in Sections 5.3.1 through 5.3.12, (c) are written to reflect the laboratory's specific means of operation, i.e. a copy of sections of the SOW of other Agency documented methods that are pasted directly into an SOP will be determined to be unsatisfactory, and (d) demonstrate the laboratories capability to comply with all of the requirements of the SOW.

Phase 2: Vendors determined to have submitted satisfactory SOPs will then be sent a Performance Evaluation Sample for analysis in accordance with the methods detailed in the SOW. Offerors will have 35 days to perform the analysis and report their findings to the Agency as described in the "Pre-Award Performance Evaluation Sample (PA-PES) Qualification Requirements" document.

Phase 3: For those offerors that "pass" the PES phase, the EPA and their designees will conduct an on-site laboratory audit to determine the adequacy of the facilities, processes, and personnel in place for performance under the resultant contracts.

Offerors were notified in the Commerce Business Daily of this requirement on March 19, 2001 and warned that failure to complete all phases before the date set for contract awards would preclude a firm from award. Contract awards will not be delayed to allow a vendor to complete the pre-award qualification requirements.

2. SOLICITATION REQUIREMENTS

Pricing will be determined via the competitive task order process as requirements arise. However, to address the possibility that a vendor will be unable to "win" a task order through that process, each offeror shall insert representative prices for each type of sample analysis described in clause B.1 "Fixed-Prices-Indefinite Delivery/Indefinite Quantity Contracts." These prices will be used to issue unilateral orders if needed to meet stated contract minimums.

Offerors shall complete all Representations and Certifications contained in Section K of this solicitation.

Offerors shall provide past performance history which will be used to assist the contracting officer in determining contractor responsibility.

L.10 BEST ESTIMATE OF WORK TO BE PERFORMED

The Government's best estimate of the amount of combined work to be ordered under the resulting multiple awards is $2,000,000 over the three (3) year ordering period.

L.11 PAST PERFORMANCE INFORMATION (EPAAR 1552.215-75) (OCT 2000)

(a) Offerors shall submit the information requested below as part of their proposal. The information may be submitted prior to other parts of the proposal in order to assist the Government in reducing the evaluation period.

(b) Offerors shall submit a list of all or at least 3 contracts and subcontracts completed in the last 5 years, and all contracts and subcontracts currently in process, which are similar in nature to this requirement.

(1) The contracts listed may include those entered into with Federal, State and local governments, and commercial businesses, which are of similar scope, magnitude, relevance, and complexity to the requirement which is described in the RFP. Include the following information for each contract and subcontract listed:

(a) Name of contracting activity.
(b) Contract number.
(c) Contract title.
(d) Contract type.
(e) Brief description of contract or subcontract and relevance to this requirement.
(f) Total contract value.
(g) Period of performance.
(h) Contracting officer, telephone number, and E-mail address (if available).
(i) Program manager/project officer, telephone number, and E-mail address (if available).
(j) Administrative Contracting officer, if different from (h)above, telephone number, and E-mail address (if available).
(k) List of subcontractors (if applicable).
(l) Compliance with subcontracting plan goals for small disadvantaged business concerns, monetary targets for small disadvantaged business participation, and the notifications submitted under FAR 19.1202-4 (b), if applicable.

(c) Offerors should not provide general information on their performance on the identified contracts and subcontracts. General performance information will be obtained from the references.

(1) Offerors may provide information on problems encountered and corrective actions taken on the identified contracts and subcontracts.

(2) References that may be contacted by the Government include the contracting officer, program manager/project officer, or the administrative contracting officer identified above.

(3) If no response is received from a reference, the Government will make an attempt to contact another reference identified by the offeror, to contact a reference not identified by the offeror, or to complete the evaluation with those references who responded. The Government shall consider

the information provided by the references, and may also consider information obtained from other sources, when evaluating an offeror's past performance.

(4) Attempts to obtain responses from references will generally not go beyond two telephonic messages and/or written requests from the Government, unless otherwise stated in the solicitation. The Government is not obligated to contact all of the references identified by the offeror.

(d) If negative feedback is received from an offeror's reference, the Government will compare the negative response to the responses from the offeror's other references to note differences. A score will be assigned appropriately to the offeror based on the information. The offeror will be given the opportunity to address adverse past performance information obtained from references on which the offeror has not had a previous opportunity to comment, if that information makes a difference in the Government's decision to include the offeror in or exclude the offeror from the competitive range. Any past performance deficiency or significant weakness will be discussed with offerors in the competitive range during discussions.

(e) Offerors must send Client Authorization Letters (see Section J of the solicitation) to each reference listed in their proposal to assist in the timely processing of the past performance evaluation. Offerors are encouraged to consolidate requests whenever possible (i.e., if the same reference has several contracts, send that reference a single notice citing all applicable contracts). Offerors may send Client Authorization Letters electronically to references with copies forwarded to the contracting officer.

(1) If an offeror has no relevant past performance history, an offeror must affirmatively state that it possesses no relevant past performance history.

(2) Client Authorization Letters should be mailed or E-mailed to individual references no later than five (5) working days after proposal submission. The offeror should forward a copy of the Client Authorization Letter to the contracting officer simultaneously with mailing to references.

(f) Each offeror may describe any quality awards or certifications that indicate the offeror possesses a high-quality process for developing and producing the product or service required. Such awards or certifications include, for example, the Malcolm Baldrige Quality Award, other Government quality awards, and private sector awards or certifications.

(1) Identify the segment of the company (one division or the entire company) which received the award or certification.

(2) Describe when the award or certification was bestowed. If the award or certification is over three years old, present evidence that the qualifications still apply.

(g) Past performance information will be used for both responsibility determinations and as an evaluation factor for award. The Past Performance Questionnaire identified in section J will be used to collect information on an offeror's performance under existing and prior contracts/subcontracts for products or services similar in scope, magnitude, relevance, and complexity to this requirement in order to evaluate offerors consistent with the past performance evaluation factor set forth in section M. References other than those identified by the offeror may be contacted by the Government and used in the evaluation of the offeror's past performance.

(h) Any information collected concerning an offeror's past performance will be maintained in the official contract file.

(i) In accordance with FAR 15.305 (a) (2) (iv), offerors with no relevant past performance history, or for whom information on past performance is not available, will be evaluated neither favorably nor unfavorably on past performance.

L.12 TECHNICAL QUESTIONS (EP 52.215-110) (APR 1984)

Offerors must submit all technical questions concerning this solicitation in writing to the contract specialist. EPA must receive the questions no later than fifteen (15) calendar days after the date of this solicitation. EPA will answer questions which may affect offers in an amendment to the solicitation. EPA will not reference the source of the questions.

L.13 IDENTIFICATION OF SET-ASIDE/8A PROGRAM APPLICABILITY (EP 52.219-100) (FEB 1991)

This procurement is being processed as follows:

(a) Type of set-aside: No Applicable Set-Aside

(b) 8(a) Program: Not Applicable

L.14 COMPLIANCE WITH FAR CLAUSE 52.222-43, "FAIR LABOR STANDARDS ACT AND SERVICE CONTRACT ACT - PRICE ADJUSTMENT (MULTIPLE YEAR AND OPTION CONTRACTS)" (EP 52.222-100) (FEB 1994)

Offerors are reminded that in accordance with FAR Clause 52.222- 43, "Fair Labor Standards Act and Service Contract Act - Price Adjustment (Multiple Year and Option Contracts)", offerors must warrant that the prices in this contract for labor categories subject to prevailing wage determinations and collective bargaining agreements do not include allowance for any contingency to cover increased costs for which adjustment is provided under this clause.

Offerors shall not include escalation for direct labor and fringe costs for the option years for these covered labor categories in their proposals. In accordance with FAR 52.222-43, during contract performance, the contract price or fixed labor rates will be adjusted to reflect the successful offeror's actual increase or decrease in applicable wages and fringe benefits.

L.15 NOTICE OF FILING REQUIREMENTS FOR AGENCY PROTESTS (EPAAR 1552.233-70) (JUL 1999)

Agency protests must be filed with the Contracting Officer in accordance with the requirements of FAR 33.103(d) and (e). Within 10 calendar days after receipt of an adverse Contracting Officer decision, the protester may submit a written request for an independent review by the Head of the Contracting Activity. This independent review is available only as an appeal of a Contracting Officer decision on a protest. Accordingly, as provided in 4 CFR 21.2(a)(3), any protest to the GAO must be filed within 10 days of knowledge of the initial adverse Agency action.

L.16 ADDITIONAL BID/PROPOSAL SUBMISSION INSTRUCTIONS (EP-S 99-2) (MAR 1999)

a. General Instructions

These instructions are in addition to the applicable requirements and clauses set forth in the Federal Acquisition Regulation regarding bid/proposal submission and late bid/proposals. Please note that there are distinct addresses designated for bid/proposal submission on the SF 33. Block 7 designates the location specified for delivery of hand carried/courier/overnight delivery service bids/proposals while Block 8 indicates the address specified for receipt of bid/proposals sent by U.S. Mail. Bidders/Offerors are responsible for ensuring that their bids/proposals (and any amendments, modifications, withdrawals, or revisions thereto) are submitted so as to reach the Government office designated on the SF 33 prior to the designated date and time established for receipt. Bidders and offerors are also responsible for allowing sufficient time for the bid/proposal to be processed through EPA's internal mail distribution system described below so as to reach the designated location for bid/proposal receipt on time. Failure to timely deliver a bid/proposal to the EPA Bid & Proposal Room on the 6th floor of the Ronald Reagan Building, which is the location designated for bid/proposal receipt in blocks 7 and 8 of the SF 33, will render the bid/proposal "late" in accordance with FAR 14.304 and/or 15.208 and disposition of the bid/proposal will be handled in accordance with FAR 14.304 and 52.214-7 for bids and FAR 15.208 and 52.215-1 for proposals. Bidders/Offerors are cautioned that receipt of a bid/proposal by the Agency's mail room or other central receiving facility does not constitute receipt by the office designated in the solicitation/invitation for bids.

b. U.S. Mail Delivery-SF 33 Block 8

Block 8 on the SF 33 indicates that bids/proposals sent by U.S. Mail must be timely received by the Bid & Proposal Room, Mail Code 3802R. Because EPA adheres to a centralized mail delivery system, any bid/proposal submitted via U.S. Mail to the address specified in block 8 of the SF 33 is initially routed to EPA's mail handling facility at another location in S.W. Washington, DC, and then subsequently routed to EPA's Bid & Proposal Room (Mail Code 3802R) located on the 6th floor of the Ronald Reagan Building. The Bid and Proposal Room on the 6th floor of the Ronald Reagan Building is geographically distinct and is not co-located with the mail handling facility. Bids/proposals sent by U.S. Mail, therefore, will not be considered "received" until such time as they are physically delivered via EPA's mail distribution system to the EPA Bid & Proposal Room in the Ronald Reagan Building. Bidders/Offerors electing to utilize the U.S. Mail for bid/proposal delivery should therefore allow sufficient time prior to the designated time and date for bid/proposal receipt as specified in Block 9 of the SF 33 to allow for the internal routing of their bid/proposal to the EPA Bid & Proposal Room.

<u>All bids/proposals submitted other than by U.S. Mail should utilize the Hand Carried/Courier/Overnight Delivery Service address specified in Block 7 of the SF 33.</u>

c. Hand Carried/Courier Delivery- SF 33 Block 7

EPA's Bid & Proposal Room that is designated for receipt of hand delivered bids/proposals is located on the 6th floor of the Ronald Reagan Building, 1300 Pennsylvania Ave, N.W., Washington, D.C. The Bid and Proposal Room hours of operation are 8:00AM - 4:30PM weekdays, except Federal holidays. Because this is a secure area, EPA bidders/offerors/contractors and/or their couriers/delivery personnel must check in at the EPA visitor guard desk,

located to the left of the 13 ½ street entrance, prior to gaining access to the Bid & Proposal Room. A properly addressed bid/proposal, as described below, will be required for admittance to the Bid & Proposal Room. Bids/proposals not properly addressed will be collected by the guard, and routed to the Bid & Proposal Room through EPA's internal mail distribution system, which will delay receipt of the bid/proposal in the Bid & Proposal Room.

d. Overnight Delivery Services- SF 33 Block 7

Bid/Proposal deliveries via overnight delivery services (e.g., Federal Express, Airborne Express) must utilize the address specified in block 7 of the SF 33. Due to the large volume of overnight packages delivered to EPA at one time, all overnight delivery services deliver only to EPA's loading dock at the Ronald Reagan Building, and not directly to the Bid & Proposal Room designated for receipt of bids/proposals in block 7 of the SF 33. From the dock, packages are routed to EPA's mail room in the Ronald Reagan Building for internal distribution, including distribution to the Bid & Proposal Room. It is important to recognize that regardless of whether the Bid & Proposal Room is noted on the address label as required by block 7 of the SF 33, overnight delivery service packages are NOT regularly delivered directly to the Bid & Proposal Room. Because bids and proposals must be physically received at the Bid & Proposal Room to be considered officially received, bidders/offerors should not rely upon guaranteed delivery times from overnight delivery services as guarantees that their bids/proposals will be officially received on time. Bidders/offerors remain responsible for the timely delivery of their bids/proposals to the Bid & Proposal Room.

e. Bid/Proposal Submission Labels

EPA has developed labels for use on packages containing bids, proposals, amendments, modifications, withdrawals, or revisions. Use of these labels will facilitate the routing of bids and proposals to the Bid & Proposal Room. The label may be found on EPA's Office of Acquisition Management homepage at www.epa.gov/oam under Special Interest. The labels may be reproduced. Offerors/bidders choosing not to use the EPA labels must ensure that the following information is clearly indicated on the outside wrapper of all packages containing bids/proposals.

For US MAIL:

Environmental Protection Agency
BID and PROPOSAL ROOM, Mail Code 3802R
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Specified Date and Time for Receipt of Bids/Proposals: Date Time
Solicitation Number: _____
Offeror's Name and Address: _____
_____
_____

For Other Than US MAIL

U.S. Environmental Protection Agency
BID and PROPOSAL ROOM, Mail Code 3802R
Ronald Reagan Building, 6th Floor

1300 Pennsylvania, Ave
Washington, D.C. 20004

Specified Date and Time for Receipt of Bids/Proposals: Date _____ Time _____
Solicitation Number: _____
Offeror's Name and Address: _____
_____
_____

SECTION M - EVALUATION FACTORS FOR AWARD

M.1 EPA SOURCE EVALUATION AND SELECTION PROCEDURES--NEGOTIATED PROCUREMENTS (EPAAR 1552.215-70) (AUG 1999)

(a) The Government will perform source selection in accordance with FAR Part 15 and the EPA Source Evaluation and Selection Procedures in EPAAR Part 1515 (48 CFR Part 1515). The significant features of this procedure are:

(1) The Government will perform either cost analysis or price analysis of the offeror's cost/business proposal in accordance with FAR Parts 15 and 31, as appropriate. In addition, the Government will also evaluate proposals to determine contract cost or price realism. Cost or price realism relates to an offeror's demonstrating that the proposed cost or price provides an adequate reflection of the offeror's understanding of the requirements of this solicitation, i.e., that the cost or price is not unrealistically low or unreasonably high.

(2) The Government will evaluate technical proposals as specified in 1552.215-71, Evaluation Factors for Award.

(b) In addition to evaluation of the previously discussed elements, the Government will consider in any award decision the responsibility factors set forth in FAR Part 9.

M.2 EVALUATION FACTORS FOR AWARD (EPAAR 1552.215-71) (AUG 1999)

(a) The Government will make award to all responsible offeror(s) that have met the pre-award qualification requirements prior to the date set for contract awards, October 19, 2001 and whose offer conforms to the solicitation.

(b) Successful completion of the Pre-Award Qualification Requirements will demonstrate technical ability to perform the work required by the Statement of Work.

(c) Prices proposed in clause B.1 "Fixed Prices-Indefinite Delivery/Indefinite Quantity Contracts" will be evaluated utilizing price analysis. Offerors proposing unreasonable prices may be excluded from award.

ATTACHMENT 1

SOW - EXHIBIT A - SUMMARY OF REQUIREMENTS - ANALYSIS OF CDD'S AND CDF'S

PR-HQ-00-11943

USEPA CONTRACT LABORATORY PROGRAM

STATEMENT OF WORK

FOR

ANALYSIS OF
CHLORINATED DIBENZO-P-DIOXINS (CDDs) AND
CHLORINATED DIBENZOFURANS (CDFs)

Multi-Media, Multi-Concentration

DLM01.4
August 2001

STATEMENT OF WORK

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EXHIBIT A

SUMMARY OF REQUIREMENTS

Exhibit A - Summary of Requirements

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1.0 PURPOSE

The purpose of the multi-media, multi-concentration dioxin/furan analytical service is to provide analytical data for use by the U.S. Environmental Protection Agency, hereafter referred to as USEPA, in support of the investigation and clean-up activities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Other USEPA Program Offices, as well as customers outside the Agency, that have similar analytical data needs also use this service.

2.0 DESCRIPTION OF SERVICE

The dioxin/furan analytical service provides a contractual framework for laboratories to apply USEPA analytical methods for the isolation, detection, and quantitative measurement of 17 2,3,7,8-substituted tetra through octachlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) in water, soil, sediment, sludge, tissue (no human tissue), ash, oil, and oily matrices. The analytical service provides the methods to be used and the specific contractual requirements by which the Government will evaluate the data. This service uses a High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) method to analyze the target compounds.

3.0 DATA USES

This analytical service provides data used for a variety of purposes such as: determining the nature and extent of contamination at a hazardous waste site; assessing priorities for response based on risks to human health and the environment; determining appropriate clean-up actions; and determining when remedial actions are complete. The data may be used in all stages in the investigation of hazardous waste sites, including: site inspections; Hazard Ranking System (HRS) scoring; remedial investigation/feasibility studies; remedial design; treatability studies; and removal actions. In addition, this service provides data that are available for use in Superfund enforcement/litigation activities. The Contractor must be aware of the importance of maintaining the integrity of the data generated under this contract, since it is used to make major decisions regarding public health and environmental welfare.

4.0 SUMMARY OF REQUIREMENTS

4.1 Introduction to the Dioxin/Furan Statement of Work (SOW)

The Statement of Work (SOW) is comprised of eight exhibits. Exhibit A provides an overview of the SOW and its general requirements. Exhibit B contains a description of the reporting and deliverables requirements, in addition to the data reporting forms and instructions. Exhibit C specifies the chlorinated dibenzo-p-dioxin/chlorinated dibenzofuran (CDD/CDF) Target Compound List (TCL) for this SOW with the Contract Required Quantitation Limits (CRQLs) for the sample matrices. Exhibit D details the required analytical procedures to be used with this SOW and resulting contracts. Exhibit E provides descriptions of required Quality Assurance/Quality Control (QA/QC), Standard Operating Procedures (SOPs), QA/QC performance, and the reporting of data. Exhibit F contains Chain-of-Custody and sample documentation requirements which the Contractor shall follow. To ensure proper understanding of the terms utilized in this SOW, a glossary can be found in Exhibit G. When a term is used in the text without explanation, the glossary meaning shall be applicable. Specifications for reporting data in computer-readable format appear in Exhibit H.

4.2 Overview of Major Task Areas

For each sample, the Contractor shall perform the tasks described in each section. Specific requirements for each task are detailed in the exhibits referenced.

4.2.1 Task I: Sample Receiving, Storage, and Disposal

4.2.1.1 Chain-of-Custody

The Contractor shall receive and maintain samples under proper Chain-of-Custody. All associated document control and inventory procedures shall be developed and followed. Documentation described herein shall be required to show that all procedures are strictly followed. This documentation shall be reported as the Complete Sample Delivery Group (SDG) File [CSF] (See Exhibit B). The Contractor shall establish and use appropriate procedures to handle confidential information received from the Government.

4.2.1.2 Sample Scheduling/Shipments

Sample shipments to the Contractor's facility will be scheduled and coordinated by the Task Order Project Officer (TOPO). The Contractor shall communicate with the TOPO by telephone, as necessary, throughout the process of sample scheduling, shipment, analysis, and data reporting, to ensure that samples are properly processed.

4.2.1.2.1 Samples will be shipped routinely to the Contractor through an overnight delivery service. However, as necessary, the Contractor shall be responsible for any handling or processing of the receipt of sample shipments. This includes the pick-up of samples at the nearest servicing airport, bus station, or other carrier within the Contractor's geographical area. The Contractor shall be available to receive sample shipments at any time the delivery service is operating, including weekends.

4.2.1.2.2 If there are problems with the samples (e.g., mixed media, containers broken or leaking) or sample documentation and paperwork (e.g., Chain-of-Custody/Traffic Reports not with shipment, sample and Chain-of-Custody/Traffic Report do not correspond), the Contractor shall immediately contact the TOPO for resolution. The Contractor shall immediately notify the TOPO regarding any problems and laboratory conditions that affect the timeliness of analyses and data reporting. In particular, the Contractor shall immediately notify the TOPO in advance regarding sample data that will be delivered late and shall specify the estimated delivery date.

4.2.1.2.3 To monitor the temperature of the sample shipping cooler more effectively, a sample shipping cooler temperature blank may be included with each cooler shipped. The temperature blank will be clearly labeled: COOLER TEMPERATURE INDICATOR.

4.2.1.2.3.1 When a cooler temperature indicator bottle is included in the sample shipping cooler, the Contractor shall use the supplied cooler temperature indicator bottle to determine the cooler temperature. The temperature of the cooler shall be measured at the time of sample receipt by the Contractor.

4.2.1.2.3.2 The temperature of the sample shipping cooler shall be measured and recorded immediately upon opening the cooler, and prior to unpacking the samples or removing the packing material.

4.2.1.2.3.3 To determine the temperature of the cooler, the Contractor shall locate the cooler temperature indicator bottle in the sample shipping cooler, remove the cap, and insert a calibrated thermometer into the cooler temperature indicator bottle. Prior to recording the temperature, the Contractor shall allow a minimum of 3 minutes, but not greater than 5 minutes, for the thermometer to equilibrate with the liquid in the bottle. At a minimum, the calibrated thermometer (±1°C) shall have a measurable range of 0-50°C. Other devices which can measure temperature may be used if they can be calibrated to ±1°C and have a range of 0-50°C. If a temperature indicator bottle is not present in the cooler,

an alternative means of determining cooler temperature shall be used. Under no circumstances shall a thermometer or any other device be inserted into a sample bottle for the purpose of determining cooler temperature. The Contractor shall contact the TOPO and inform them that a temperature indicator bottle was not present in the cooler. The Contractor shall document the alternative technique used to determine cooler temperature in the SDG Narrative.

4.2.1.2.3.4 If the temperature of the sample shipping cooler's temperature indicator exceeds 10°C, the Contractor shall contact the TOPO and inform them of the temperature deviation. The TOPO will either require that no sample analysis(es) be performed or that the Contractor proceed with the analysis(es). The TOPO will provide this decision via Technical Direction in a written format to the Contractor with a copy to the Contracting Officer. For this purpose electronic mail is considered "written" direction. The Contractor shall document the TOPO's decision and the EPA/assigned sample numbers of all samples for which temperatures exceeded 10°C in the SDG Narrative.

4.2.1.2.3.5 The Contractor shall record the temperature of the cooler on Form DC-1, under Item 9 - Cooler Temperature, and in the SDG Narrative.

4.2.1.2.4 Reserved.

4.2.1.2.5 The Contractor is required to retain unused sample volume and used sample containers for a period of six (6) months after data submission. From time of receipt until analysis, the Contractor shall maintain all water/aqueous (preserved and unpreserved) and/or soil/sediment samples at 4°C (±2°C), and tissue samples at <-10°C.

4.2.1.2.6 The Contractor shall be required to routinely return sample shipping containers (e.g., coolers)as specified in individual task orders.

4.2.2 Task II: Sample Preparation and Analysis

4.2.2.1 Overview

The Contractor is advised that the samples received under this contract are usually from known or suspected hazardous waste sites and may contain high levels of organic and inorganic materials of a potentially hazardous nature and of unknown structure and concentration, and should be handled throughout the analysis with appropriate caution. It is the Contractor's responsibility to take all necessary measures to ensure laboratory safety.

4.2.2.2 Sample analyses will be ordered by individual sample or groups of samples. Each order will identify a Case number(s). A Case signifies a group of samples collected at one site or geographical area over a finite time period, and will include one or more field samples with associated blanks. Samples may be shipped to the Contractor in a single shipment or multiple shipments over a period of time, depending on the size of the Case.

4.2.2.2.1 A Case consists of one or more SDGs. The SDG will be defined in individual task orders.

4.2.2.2.2 If Performance Evaluation (PE) samples are received within a Case, they will be assigned to an SDG containing field samples for that Case. Such assignment shall be made at the time the samples are received and shall <u>not</u> be made retroactively.

4.2.2.2.3 Each sample received by the Contractor will be labeled with an EPA/assigned sample number and accompanied by a Chain-of-Custody/Traffic Report bearing the sample number and descriptive information regarding the sample. The Contractor shall complete and sign the Chain-of-Custody/Traffic Report,

recording the date of sample receipt and sample condition on receipt for each sample container.

4.2.2.2.4 The Contractor shall submit signed copies of Chain-of-Custody/Traffic Reports for all samples in an SDG to the TOPO within **three (3) working days** following receipt of the last sample in the SDG. Chain-of-Custody/Traffic Reports shall be submitted in SDG sets (e.g., all Chain-of-Custody/Traffic Reports for an SDG shall be clipped together) with a Chain-of-Custody/Traffic Report Cover Sheet containing information regarding the SDG, as specified in Exhibit B.

4.2.2.2.5 Case numbers, SDG numbers, and EPA/assigned sample numbers shall be used by the Contractor in identifying samples received under this contract, both verbally and in reports/correspondence.

4.2.2.3 Preparation Techniques

The Contractor shall prepare samples as described in Exhibit D.

4.2.2.3.1 If multiphase samples (e.g., a two-phase liquid sample) are received by the Contractor, the Contractor must contact the TOPO to apprise them of the type of sample received. If all phases of the sample are amenable to analysis, the TOPO may require the Contractor to do any of the following through written Technical Direction:

- Mix the sample and analyze an aliquot from the homogenized sample;
- Separate the phases of the sample and analyze each phase individually. The TOPO will assign sample numbers for the additional phases;
- Separate the phases and analyze one or more of the phases, but not all of the phases. The TOPO will assign sample numbers for the additional phases, if required, or
- Do not analyze the sample.

4.2.2.3.2 If insufficient sample volume (less than the required amount) is received to perform the analysis, the Contractor shall contact the TOPO to apprise them of the problem. The TOPO will either approve that no sample analysis be performed, or require that a reduced volume be used for the sample analysis through written Technical Direction. The Contractor shall document the TOPO’s decision in the SDG Narrative.

4.2.2.4 Analytical Techniques

The Target Compounds listed in Exhibit C shall be identified, as described in the methodologies given in Exhibit D. Automated computer programs may be used to facilitate the identification of compounds.

4.2.2.5 Qualitative Verification of Compounds

The dioxin and furan compounds identified by High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) techniques shall be verified by an analyst competent in the interpretation of mass spectra. The analyst will compare the HRGC Retention Time (RT) and ion abundance ratio of two exact m/z's with the corresponding RT of an authentic standard and the theoretical ion abundance ratio of the two exact m/z's.

4.2.2.5.1 If a compound initially identified by HRGC/HRMS techniques cannot be verified, but in the technical judgment of the mass spectral interpretation specialist the identification is correct, the Contractor shall report that

identification as an Estimated Maximum Possible Concentration (EMPC) and proceed with quantitation.

4.2.2.6 Quantitation of Verified Compounds
The Contractor shall quantitate components identified by HRGC/HRMS techniques using Selected Ion Current Profile (SICP) areas in one of the methods described in Exhibit D, Section 2.3.

4.2.2.7 QA/QC Procedures

4.2.2.7.1 The Contractor shall strictly adhere to all specific QA/QC procedures prescribed in Exhibits D and E. Records documenting the use of the protocol shall be maintained in accordance with the document control procedures prescribed in Exhibit F, and shall be reported in accordance with Exhibits B and H.

4.2.2.7.2 The Contractor shall maintain a Quality Assurance Plan (QAP) with the objective of providing sound analytical chemical measurements. This program shall incorporate the QC procedures, any necessary corrective action, and all documentation required during data collection, as well as the quality assessment measures performed by management to ensure acceptable data production.

4.2.2.7.3 Additional QC shall be conducted in the form of the analysis of laboratory evaluation samples submitted to the laboratory by the Government. Unacceptable results of all such QC or laboratory evaluation samples may be used as the basis for an equitable adjustment to reflect the reduced value of the data to the Government <u>or</u> rejection of the data for specific analyte(s) within an SDG or the entire SDG. Also, unacceptable results may be used as the basis for contract action. "Compliant performance" is defined as that which yields correct analyte identification and concentration values, as well as meeting the contract requirements for analysis (Exhibit D), QA/QC (Exhibit E), data reporting and other deliverables (Exhibits B and H), and sample custody, sample documentation, and SOP documentation (Exhibit F). As an alternative to data rejection, the Government may require re-analysis of noncompliant samples. Re-analysis will be performed by the Contractor at no additional cost to the Government, unless it is determined that the laboratory evaluation sample(s) was defective.

4.2.3 Task III: Sample Reporting and Resubmission of Data

4.2.3.1 Required formats for the reporting of data are found at Exhibits B and H. The Contractor shall be responsible for completing and submitting analysis data sheets and computer-readable data on diskette in a format specified in this SOW and within the time specified in Exhibit B, Section 1.1 or as specified in individual task orders.

4.2.3.2 Use of formats other than those approved will be deemed as noncompliant. Such data are unacceptable. Resubmission in the specified format will be required, at no additional cost to the Government.

4.2.3.3 Computer-generated forms may be submitted in the hardcopy Sample Data Package(s), provided that the forms are in **exact USEPA format**. This means that the order of data elements is the same as on each USEPA-required form, including form numbers and titles, page numbers, and header information.

4.2.3.4 If the submitted data package does not conform to the specified contractual or technical criteria, the Contractor shall resubmit the data package with all deficiencies corrected at its own expense. The Contractor will respond within 7 days to requests for additional information or explanations that result from inspection activities. If the Contractor is required to submit or resubmit data as a result of a request, the data shall be clearly marked as ADDITIONAL DATA. The Contractor shall include a cover letter which describes which data

are being delivered, to which project the data pertain, and who requested the data. Any and all resubmissions must be in accordance with the documentation requirements of this SOW.

4.2.3.5 The data reported by the Contractor on the hardcopy data forms and the associated computer-readable data submitted by the Contractor on diskette shall contain identical information. If discrepancies are found during inspection, the Contractor shall resubmit either the hardcopy forms or the computer-readable data, or both sets of data, as requested by the Government, at no additional cost to the Government.

ATTACHMENT 2

SOW- EXHIBIT B - REPORTING AND DELIVERABLES REQUIREMENTS

EXHIBIT B

REPORTING AND DELIVERABLES REQUIREMENTS

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1.0 CONTRACT REPORTS/DELIVERABLES DISTRIBUTION

1.1 Report Deliverable Schedule

The following table reiterates the contract reporting and deliverables requirements and specifies the distribution that is required for each deliverable unless revised in individual task orders.

NOTE: Specific recipient names and addresses are subject to change during the term of the contract. The Contracting Officer will notify the Contractor, in writing, of such changes when they occur.

TABLE 1

Item		No. of Copies[A]	Delivery Schedule	Distribution		
				TOPO	SMO	[B]
A.	Sample Chain-of-Custody/Traffic Reports	1	3 working days after receipt of last sample in the SDG[2].	X		
B.[3]	Sample Data Package[C]	2	35 days after VTSR[1] of last sample in the SDG.	X	X	
C.[3]	Data in Computer-Readable Format	1	35 days after VTSR[1] of last sample in the SDG.	X	X	
D.[3]	Results of Intercomparison Study/PE Sample Analysis Study	1	35 days after VTSR[1] of last sample in the SDG.	X		
E.[3,4]	Complete SDG File[3]	1	35 days after VTSR[1] of last sample in the SDG.	X		
F.[5]	Quality Assurance Plan (QAP)	1	Revise within 60 days after contract award. Submit within 7 days of receipt of written request by the PO or CO to recipients, as directed.	As Directed		

TABLE 1 (Con't)

Item		No. of Copies[A]	Delivery Schedule	Distribution		
				TOPO	SMO	[B]
G.[5]	Updated Standard Operating Procedures (SOPs)	1	Revise within 60 days after contract award. Submit within 7 days of receipt of written request from the CO or PO to recipients, as directed.	As Directed		
H.	GC/MS Tapes	Lot	Retain for 3 years after data submission. Submit within 7 days after receipt of written request from the CO or PO.	As Directed		
I.	Extracts	Lot	Retain for one (1) year after data submission. Submit within 7 days after receipt of written request by the TOPO, PO or CO.	As Directed		

Footnotes:

[A]The number of copies specified is the number of copies required to be delivered to each recipient.

[B]Project Officer (PO).

[C]Contractor-concurrent delivery to a Government designated recipient may be required upon request by the Project Officer. Retain for one (1) year after data submission, and submit as directed within 7 days after receipt of written request by the Project Officer or Contracting Officer.

[1]Validated Time of Sample Receipt (VTSR) is the date of sample receipt at the Contractor's facility, as recorded on the shipper's delivery receipt and sample Traffic Report.

[3] **DELIVERABLES ARE TO BE REPORTED TOTAL AND COMPLETE.** Concurrent delivery is required. This includes resubmission of both the hardcopy and electronic deliverable. The date of delivery of the SDG, or of any sample within the SDG, is the date all samples have been delivered. **If the deliverables are due on a Saturday, Sunday, or Federal holiday, then they shall be delivered on the next business day. Deliverables received after this time shall be considered late.**

[4]A complete SDG file will contain the original Sample Data Package, plus all the original documents described in Exhibit B, Section 2.6, and Exhibit E.

[5]See Exhibit E and F for more description; time is cited in calendar days.

1.2 Distribution

The following addresses correspond to the "Distribution" column in Table 1 of Section 1.1.

SMO: USEPA Sample Management Office (SMO)[6]
2000 Edmund Halley Drive
Reston, VA 20191-3436

Task Order Project Officer (TOPO): As identified in individual task orders.

Project Officer (PO):

Mailing Address: USEPA OERR Analytical Operations/
Data Quality Center (AOC)
Ariel Rios Building (5204G)
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Attn: Dioxin Program Manager/Project Officer

Fed-Ex/Overnight Delivery: USEPA OERR Analytical Operations/
Data Quality Center
1235 Jefferson Davis Highway
Crystal Gateway I, 12th Floor
Arlington, VA 22202
Attn: Dioxin Program Manager/Project Officer

2.0 REPORTING REQUIREMENTS AND ORDER OF DATA DELIVERABLES

2.1 Introduction

The Contractor shall provide reports and other deliverables as specified in the Contract Schedule. The required content and form of each deliverable are described in this exhibit. All reports and documentation must be:

- Legible;
- Clearly labeled and completed in accordance with instructions in this exhibit;
- Arranged in the order specified in this section;
- Paginated sequentially in ascending order starting from the SDG Narrative; and
- Copies must be legible and double-sided.

NOTE: Complete Sample Delivery Group (SDG) Files (CSFs) need not be double-sided. (The CSF is composed of original documents.) However, Sample Data Packages delivered to the Sample Management Office (SMO) must be double-sided.

2.1.1 Requirements for each deliverable item are specified in Sections 2.3 through 2.9. Prior to submission, the Contractor shall arrange items and the components of each item in the order listed in these sections.

2.1.2 The Contractor shall use EPA/assigned Case numbers, SDG numbers, EPA/assigned sample numbers, and task order numbers (if applicable) to identify samples received under this contract, both verbally and electronically and in reports and

[6]SMO is a Contractor-operated facility operating under the Sample Management Office (SMO) contract awarded and administered by USEPA.

correspondence. The Contract number and task order number if applicable shall be specified in all correspondence.

2.2 Resubmission of Data

2.2.1 If submitted documentation does not conform to the instructions in this exhibit, the Contractor shall be required to resubmit such documentation with deficiency(ies) corrected, at no additional cost to the Government.

2.2.2 Whenever the Contractor is required to submit or resubmit data as a result of an onsite laboratory evaluation, or through TOPO action or request, the data must be clearly marked as ADDITIONAL DATA and must be sent to all contractual data recipients as well as designated recipients. A cover letter will be included, by the Contractor describing what data are being delivered, to which project the data pertain, and who requested the data. A copy of the cover letter shall be submitted to the Contracting Officer.

2.3 Quality Assurance (QA) Plan and Standard Operating Procedures (SOPs)

The Contractor shall adhere to the requirements in Exhibits E and F.

2.4 Sample Chain-of-Custody/Traffic Reports

2.4.1 Each sample received by the Contractor shall be labeled with a designated sample number and will be accompanied by a Chain-of-Custody/Sample Traffic Report bearing the sample number and descriptive information regarding the sample. The Contractor shall complete the Chain-of-Custody/Traffic Report, recording the date of sample receipt and sample condition upon receipt for each container, and shall sign the Chain-of-Custody/Traffic Report. Information shall be recorded for each sample in the SDG.

2.4.2 The contractor shall submit Chain-of-Custody/Traffic Reports in SDG sets (i.e., Chain-of-Custody/Traffic Reports for all samples in an SDG shall be clipped together), with a cover sheet attached. The Traffic Report cover sheet shall contain the following items:

- Laboratory name;
- Contract number and Task Order Number;
- Sample analysis price;
- Case number; and
- List of designated sample numbers of all samples in the SDG, identifying the **first** and **last** samples received, and their Laboratory Receipt Dates (LRDs).

2.4.3 Each Chain-of-Custody/Traffic Report must be clearly marked with the SDG number. This information should be entered below the LRD on the Chain-of-Custody/Traffic Report. In addition, the Chain-of-Custody/Traffic Report for the <u>last</u> sample received in the SDG must be clearly marked "SDG - FINAL SAMPLE". The Designated sample number of the first sample received in the SDG is the SDG number. When several samples are received together in the first SDG shipment, the SDG number will be the lowest sample number (considering both alpha and numeric designations) in the first group of samples received under the SDG.

2.4.4 If samples are received at the laboratory with multi-sample Chain-of-Custody/Traffic Reports, all the samples on one multi-sample Chain-of-Custody/Traffic Reports may not necessarily be in the same SDG. In this instance, the Contractor must make the appropriate number of photocopies of the Chain-of-Custody/Traffic Report and submit one copy with each Chain-of-Custody/Traffic Report Cover Sheet.

2.5 Sample Data Package

The Sample Data Package will include data for analyses of all samples in one SDG, including field samples, dilutions, re-analyses, blanks, and Laboratory Control Samples (LCSs). The Sample Data Package is divided into the three major units (SDG Narrative, Chain-of-Custody/Traffic Reports, and chlorinated dibenzo-p-dioxins [CDD] and chlorinated dibenzofurans [CDF] data) described below. The Contractor will retain a copy of the Sample Data Package for one (1) year after final acceptance of data. After this time, the Contractor may dispose of the package.

2.5.1 SDG Narrative

2.5.1.1 This document will be clearly labeled "SDG Narrative" and will contain: Laboratory name; Case number; designated sample numbers, differentiating between initial analyses and re-analyses; SDG number; Contract number; Task Order number; and detailed documentation of any quality control, samples, shipment and/or analytical problems encountered in processing the samples reported in the data package.

All Gas Chromatograph (GC) columns used for analysis shall be documented in the SDG Narrative. List the GC Column identification: brand-name, internal diameter in mm, and length in meters, coating material, and film thickness.

NOTE: If a column is used that has different first and last eluting isomers than the DB-5 column, the Contractor shall fully document, in the SDG Narrative, the order of elution of the isomers and identify the first and last eluting isomers for that particular column for the Window Defining Mix (WDM) and the Mid-Point Calibration Standard (CS3) Solution.

2.5.1.2 Whenever data from sample re-analyses are submitted, the Contractor shall state the reason in the SDG Narrative for <u>each</u> re-analysis. The Contractor must also include any problems encountered, both technical and administrative, the corrective actions taken and the resolutions, and an explanation for all flagged edits (i.e., manual edits) on quantitation lists. This includes documenting the alternative technique used to determine cooler temperature if a temperature indicator bottle is not present in the cooler. The Contractor shall also provide, in the SDG Narrative, sufficient information including equations or curves to allow the recalculation of sample results from raw instrument output. The Contractor shall also include a discussion of any requested SOW modifications. This includes attaching a copy of the approved modification form to the SDG Narrative.

2.5.1.3 The SDG Narrative shall contain the following statement, <u>verbatim</u>: **"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature."** This statement shall be directly followed by the original signature of the Laboratory Manager or his/her designee with a typed line below it containing the signer's name and title, and the date of signature. All copies of the SDG Narrative shall be signed in an original signature.

2.5.2 Chain-of-Custody/Traffic Reports

2.5.2.1 The Contractor shall include a copy of each Chain-of-Custody/Traffic Report submitted in Section 2.4 for all of the samples in the SDG. The Chain-of-Custody/Traffic Reports shall be arranged in increasing sample number order, considering <u>both</u> letters and numbers in ordering samples. Copies of the Chain-of-Custody/Traffic Report Cover Sheet shall be included with the copies of the Chain-of-Custody/Traffic Reports.

2.5.2.2 If samples are received at the laboratory with multi-sample Chain-of-Custody/Traffic Reports, all the samples on one multi-sample Chain-of-Custody/Traffic Report may not necessarily be in the same SDG. In this instance, the Contractor must make the appropriate number of photocopies of

the Chain-of-Custody/Traffic Report so that a copy is submitted with each applicable data package.

2.5.2.3 In any instance where samples from more than one multi-sample Chain-of-Custody/Traffic Report are in the same data package, the Contractor must submit a copy of the Chain-of-Custody/Traffic Report Cover Sheet with copies of the Chain-of-Custody/Traffic Reports.

2.5.3 CDD/CDF Data

2.5.3.1 CDD/CDF Sample Data

Sample data shall be arranged in packets with the CDD/CDF Sample Data Summary (Form I-HR CDD-1, Forms I-HR CDD-2, and CDD-3, if applicable), followed by the raw data for the sample and Form II-HR CDD. These sample packets shall be placed in order of increasing designated sample number, considering both letters and numbers.

2.5.3.1.1 Sample Data Summary (Form I-HR CDD-1)

Tabulated results (identification and quantification) of the specified target analytes and recoveries of the associated labeled compounds shall be included. The validation and release of these results are authorized by a specific, signed statement in the SDG Narrative (see Section 2.5.1.3). In the event that the Laboratory Manager cannot verify all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

2.5.3.1.2 Toxicity Equivalence Summary (Form I-HR CDD-2)

Tabulated adjusted concentrations for the target analytes based on toxicity equivalent factors. This form shall be included, even if no target analytes are positively identified.

2.5.3.1.3 Second Column Confirmation (Form I-HR CDD-3)

Tabulated results (identification and quantitation) of 2,3,7,8-TCDD, 2,3,7,8-TCDF and the recoveries of their corresponding labeled compounds on a second GC column if original analysis was performed on a DB-5 GC column, or equivalent.

2.5.3.1.4 Selected Ion Current Profile (SICP) for each sample or sample extract, including dilutions and re-analyses.

SICPs must be presented so the two quantitation ions, any relevant labeled compounds, and diphenyl ether interferents are on one page. The internal standards can be presented on another page. The SICP must show the full time window scanned for each ion. Enlarge any SICP peak for any 2,3,7,8-substituted congener present below the signal-to-noise (S/N) ratio of 10 or below the Contract Required Quantitation Limit (CRQL). Each SICP must contain the following header information:

- Designated sample number;
- Date and time of analysis;
- Absolute Retention Time (RT) (and scan number if available) of identified compounds;
- High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) Instrument ID;
- Lab File ID; and
- Analyst ID.

2.5.3.1.5 If automated data system procedures are used for preliminary identification and/or quantitation of the target compounds, the complete data system report, including but not limited to quantitation reports and area summaries, shall be provided in all Sample Data Packages, in addition to the SICPs. The complete data system report shall include all of the information listed below. For laboratories which do not use the automated data system procedures, a laboratory "raw data sheet" containing the following information shall be included in the Sample Data Package, in addition to the SICP:

- Designated sample number;
- Date and time of analysis;
- RT (and scan number if available) of identified target compounds;
- Ions used for quantitation with measured areas;
- Copy of area table from data system;
- HRGC/HRMS Instrument ID;
- Lab File ID; and
- Analyst ID.

2.5.3.1.6 In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the HRGC/HRMS operator shall identify the changes made to the report, by initialing and dating all handwritten changes, and shall include the integration scan range. In addition, a hardcopy printout of the chromatogram displaying the manual integration shall be included in the raw data.

NOTE: Second column confirmation is required for all samples in which 2,3,7,8-TCDF is positively identified at, or above, the CRQL by analysis on a DB-5 (or equivalent) HRGC column, or if 2,3,7,8-TCDF is reported as an Estimated Maximum Possible Concentration (EMPC) at, or above, the CRQL.

2.5.3.1.7 Total Homologue Concentration Summary (Form II-HR CDD)

Tabulated total homologue concentrations shall be completed for each sample, blank, and QC sample analyzed. EMPC values shall be flagged "*", and the Estimated Detection Limit (EDL) shall be qualified "U" on the form.

2.5.3.2 Quality Control Data

2.5.3.2.1 Lab Control Sample Summary (Form III-HR CDD) - in order by Designated sample number assigned to the LCS.

2.5.3.2.2 Method Blank Summary (Form IV-HR CDD) - in order by Designated sample number assigned to the blanks.

2.5.3.2.3 Window Defining Mix Summary (Form V-HR CDD-1) - in order by Designated sample number assigned to the WDM.

A Window Defining Mix Summary must be completed for each 12-hour period. The retention time for the first and last eluting CDD and CDF isomers are included on this form.

2.5.3.2.4 Chromatographic Resolution Summary (Form V-HR CDD-2) - in order by Designated sample number assigned to the standard used to evaluate the column resolution.

A Chromatographic Resolution Summary must be completed for each 12-hour period.

2.5.3.2.5 Analytical Sequence Summary (Form V-HR CDD-3) - This form is used to report the analytical sequence for CDD/CDF analysis for all GC columns and instruments.

2.5.3.3 Calibration Data

2.5.3.3.1 Initial Calibration Data (Form VI-HR CDD-1, CDD-2) - in order by instrument, if more than one instrument is used.

2.5.3.3.1.1 Perfluorokerosene (PFK) mass resolution for initial calibration shall be provided and labeled with designated sample number, date and time, HRGC/HRMS Instrument ID, Lab File ID, and Analyst ID.

2.5.3.3.1.2 CDD/CDF standard(s), SICPs, and complete data system reports including area summaries for the initial (five-point) calibration shall be labeled as stated in Sections 2.5.3.1.4 and 2.5.3.1.5.

2.5.3.3.1.3 When more than one initial calibration is performed, the data must be arranged in chronological order by instrument.

2.5.3.3.2 Continuing Calibration Data (Form VII-HR CDD-1, CDD-2) - in order by instrument, if more than one instrument is used.

2.5.3.3.2.1 PFK mass resolution for continuing calibration shall be provided for each 12-hour period and labeled with designated sample number, date and time, HRGC/HRMS Instrument ID, Lab File ID, and Analyst ID.

2.5.3.3.2.2 CDD/CDF standard(s), SICPs, and complete data system reports including area summaries for all continuing calibrations shall be labeled as specified in Sections 2.5.3.1.4 and 2.5.3.1.5.

2.5.3.3.2.3 When more than one continuing calibration is performed, the data must be arranged in chronological order, by instrument.

2.5.3.3.2.4 In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the HRGC/HRMS operator shall identify such edits or manual procedures by initialing and dating the changes made to the report, and shall include the integration scan page. In addition, a hardcopy printout of the chromatogram of the quantitation ion(s) displaying the manual integration shall be included in the raw data. This applies to all compounds listed in Exhibit C, labeled compounds, and internal standards.

2.5.3.4 Raw Quality Control Data

2.5.3.4.1 Blank Data shall be included in order by designated sample number assigned to the blank.

- FORM I-HR CDD-1, CDD-2, and CDD-3, if applicable.
- SICPs and a complete data system report including area summaries shall be submitted for each blank analyzed, and labeled as specified in Sections 2.5.3.1.4 and 2.5.3.1.5.

2.5.3.4.2 Laboratory Control Sample Data

- Tabulated results (FORM I-HR CDD-1 and CDD-2).
- SICPs and a complete data system report including area summaries labeled as specified in Sections 2.5.3.1.4 and 2.5.3.1.5.

2.6 Complete Sample Delivery Group (SDG) File (CSF)

2.6.1 A CSF, including the original Sample Data Package, shall be delivered to the SMO concurrently with delivery of the Sample Data Package to the TOPO. The contents of the CSF shall be numbered according to the specifications described in Sections 3.6. The CSF shall contain all original documents specified in Sections 3 and 4, and in Form DC-2. No copies shall be placed in the CSF unless the originals were initially written in a bound notebook maintained by the laboratory, or the originals were previously submitted to the Government with another SDG in accordance with the requirements described in Exhibit F.

2.6.2 The CSF shall consist of the following original documents, in addition to the documents in the Sample Data Package:

- Original Sample Data Package;
- A completed and signed CDD/CDF CSF Inventory Sheet (Form DC-2);
- All original shipping documents including, but not limited to, the following:
  - Chain-of-Custody Record;
  - Airbills (if an airbill is not received, include a hardcopy receipt from the shipping company or a printout of the shipping company's electronic tracking information);
  - Chain-of-Custody/Traffic Reports; and
  - Sample tags (if present) sealed in plastic bags.
- All original receiving documents including, but not limited to, the following:
  - Form DC-1;
  - Other receiving forms or copies of receiving logbooks, and
  - Chain-of-Custody/Traffic Report cover sheet.
- All original laboratory records not already submitted in the Sample Data Package of sample transfer, preparation, and analysis including, but not limited to, the following documents:
  - Original preparation and analysis forms or copies of preparation and analysis logbook pages;
  - Internal sample and sample extract transfer Chain-of-Custody records;
  - Screening records; and
  - All instrument output, including strip charts from screening activities.
- All other original SDG-specific documents in the possession of the Contractor, including, but not limited to, the following documents:
  - Telephone contact logs;
  - Copies of personal logbook pages;
  - All hand-written SDG-specific notes; and
  - Any other SDG-specific documents not covered by the above.

NOTE: All Case-related documentation may be used or admitted as evidence in subsequent legal proceedings. Any other SDG-specific documents generated after the CSF are sent to the TOPO, as well as copies that are altered in any fashion, are also deliverables to the Government (original to the TOPO and copies to SMO).

2.6.3 If the Contractor does submit SDG-specific documents to the Government after submission of the CSF, the documents shall be identified with unique accountable numbers, a revised Form DC-2 shall be submitted, and the unique accountable numbers and locations of the documents in the CSF shall be recorded in the "Other Records" section on the revised Form DC-2. Alternatively, the Contractor may number the newly submitted SDG-specific documents to the Government as a new CSF

and submit a new Form DC-2. The revised Form DC-2 or new Form DC-2 should be submitted to the TOPO only.

2.7 Data in Computer-Readable Format

The Contractor shall provide a computer-readable copy of all sample data, as specified in Exhibit H, and delivered as specified in Section 1 of this exhibit. Computer-readable data deliverables shall be submitted on an IBM or IBM-compatible formatted 3.5-inch high-density 1.44 MB diskette(s), unless otherwise specified. When submitted, diskette(s) shall be packaged and shipped in such a way that the diskette(s) cannot be bent or folded and shall not be exposed to extreme heat/cold or any type of electromagnetic radiation. The diskette(s) shall be included in the same shipment as the hardcopy data, and, at a minimum, shall be enclosed in a diskette mailer. The data shall adhere to the specifications listed in Exhibit H.

2.8 High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) Tapes

2.8.1 The Contractor shall store <u>all</u> raw and processed HRGC/HRMS data on magnetic media in the appropriate instrument manufacturer's format. This media must include data for samples, LCSs, blanks, initial and continuing calibrations, as well as all laboratory-generated quantitation reports and SICPs required to generate the data package. The Contractor shall maintain a written reference logbook of tape files to Designated sample number, calibration data, standards, and blanks. The logbook shall include designated sample numbers and Standard and Blank IDs, identified by Case, Task Order number, and SDG. The Contractor is required to retain the HRGC/HRMS tapes for three (3) years after submission of the reconciled complete data package. During that time, the Contractor shall submit tapes and associated logbook pages within 7 days after receipt of a written request from the TOPO or CO.

2.8.2 When submitting HRGC/HRMS tapes to the Government, the following materials shall be delivered in response to the request:

- All associated raw data files for samples, blanks, QC samples, LCSs, and initial and continuing calibration standards;
- All processed data files and quantitation output files associated with the raw data files described above;
- All associated identifications and calculation files used to generate the data submitted in the data package; and
- A copy of the Contractor's written reference logbook relating tape files to sample number, calibration data, standards, blanks, and LCSs. The logbook shall include sample numbers and laboratory file identifiers for all samples, blanks, and standards, identified by Case and SDG.

2.8.3 The laboratory shall also provide a statement attesting to the completeness of the HRGC/HRMS data tape submission, signed and dated by the Laboratory Manager and/or designee. This statement shall be part of a cover sheet that includes the following information relevant to the magnetic media submission:

- Laboratory name;
- Date of submission;
- Case number;
- Task Order number;
- SDG number;
- HRGC/HRMS make and model number;

- Software version;
- Disk drive type (e.g., CDC, PRIAM);
- File transfer method (e.g., Document Structure Definition [DSD], Document Type Definition [DTD], File Transfer Protocol [FTP], Aquarius); and
- Names and telephone numbers of two laboratory contacts for further information regarding the submission.

2.9 Extracts

2.9.1 The Contractor shall preserve sample extracts in the dark at <-10° in bottles/vials with Teflon-lined septa. Extract bottles/vials shall be labeled with the Designated sample number, Case number, SDG number, and Task Order number. A logbook of stored extracts, listing designated sample numbers and associated Case and SDG numbers, shall be maintained.

2.9.2 The Contractor is required to retain extracts for one (1) year following submission of reconciled complete data package. During that time, the Contractor shall submit extracts and associated logbook pages within 7 days following receipt of a written request from the TOPO or CO.

3.0 FORM INSTRUCTIONS

3.1 Introduction

This section contains specific instructions for completion of all required chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDD/CDF) Data Reporting Forms.

3.2 General Information

3.2.1 The data reporting forms presented in Exhibit B, Section 4.0, have been designed in conjunction with the computer-readable data formats specified in Exhibit H, “Data Dictionary and Format for Data Deliverables in Computer-Readable Format”. The specific length of each variable for computer-readable data transmission purposes is given in Exhibit H. Information entered on these forms shall **not** exceed the size of the field given on the form, including such laboratory generated items as “Lab Name” and “Lab Sample ID”.

NOTE: On the hardcopy forms, the space provided for entries is greater in some instances than the length prescribed for the variable as written to the electronic deliverable (see Exhibit H). Greater space is provided on the hardcopy forms for visual clarity.

3.2.2 All characters which appear on the data reporting forms presented in Section 4 must be reproduced by the Contractor when submitting data, and the format of the forms submitted must be identical to that shown in the contract. No information may be added, deleted, or moved from its specified position without prior written approval of the Project Officer (PO). The names of the various fields and compounds (e.g., "Lab Code”, "2378-TCDD") must appear as they do on the forms in the contract, including the options specified in the form (i.e., "Matrix: (Soil, Water, Ash, Tissue, Oil)" must appear, not just "Matrix"). For items appearing on the uncompleted forms (Section 4), the use of uppercase and lowercase letters is optional.

3.2.3 Alphabetic entries made onto the forms by the Contractor shall be in ALL UPPERCASE letters (e.g., "SOIL”, not "Soil" or "soil"). If an entry does not fill the entire blank space provided on the form, null characters shall be used to remove the remaining underscores that comprise the blank line.

3.3 Header Information

Six pieces of information are common to the header section of each data reporting form. They are Lab Name, Contract, Lab Code, Case No., Task Order No., and SDG No. Except as noted below for Task Order No., this information must be entered on every form and must match on every form.

3.3.1 "Lab Name" will be the name chosen by the Contractor to identify the laboratory. It may not exceed 25 characters.

3.3.2 "Lab Code" is an alphanumeric abbreviation of up to six letters and numbers assigned by USEPA to identify the laboratory and aid in data processing. This lab code will be assigned by USEPA at the time a contract is awarded and shall not be modified by the Contractor, except at the direction of CO. If a change of name or ownership occurs at the laboratory, the lab code will remain the same unless and until the Contractor is directed by the CO to use another USEPA-assigned lab code.

3.3.3 "Case No." is the assigned Case number associated with the sample and reported on the Chain-of-Custody/Traffic Report or sample shipping paperwork.

3.3.4 "Contract" is the number of the contract under which the analyses were performed.

3.3.5 "SDG No." is the designated sample number of the first sample received in the SDG. When several samples are received together in the first SDG shipment, the SDG number shall be the lowest sample number (considering both alpha and numeric designations) in the first group of samples received under the SDG.

3.3.6 The "Task Order No." is the Task Order Number under which the analyses were performed.

3.3.7 The "Sample number" is the designated sample number provided by the Government and is the other information common to most of the forms. This number appears either in the upper right-hand corner of the form, or as the left column of a table summarizing data from a number of samples.

3.3.7.1 All samples, Laboratory Control Samples (LCSs), blanks, and standards shall be identified with a designated sample number. For field samples, the designated sample number is based on the unique identifying number given in the Chain-of-Custody/Traffic Report or sample shipping records for that sample.

3.3.7.2 In order to facilitate data assessment, the following suffixes must be used:

DXXXXX = Designated sample number
DXXXXXRE = Re-extracted and re-analyzed aliquot of sample "DXXXXX"
DXXXXXDL = Diluted analysis of sample "DXXXXX"

3.3.7.3 Form V-HR CDD-3 requires that all samples analyzed in a given 12-hour analytical sequence be listed, regardless of whether or not they are part of the SDG being reported, and regardless of whether or not they are Government samples. Therefore, use "ZZZZZZ" as the designated sample number for any sample analysis that is not associated with the SDG being reported.

3.3.7.4 For blanks and standards, the following identification scheme must be used as the "Sample No.":

- Method blanks shall be identified as DFBLK##;
- Calibration standards shall be identified as CS1##, CS2##, CS3##, CS4##, and CS5##, and shall correspond to the calibration solutions identified in Exhibit D;
- The Window Defining Mixture (WDM) shall be identified as WDM##;
- The Isomer Specificity Check (ISC) shall be identified as ISC##;
- If combined, the WDM and ISC shall be identified as CPS##;

- The LCS shall be identified as DLCS##; and

- The perfluorokerosene (PFK) mass resolution check shall be identified as PFK##.

3.3.7.5 "Sample No." must be unique within an SDG. Therefore, the Contractor must replace the two-character "##" terminator of the identifier with one or two characters or numbers, or a combination of both, to create a unique sample number for each blank and standard within the SDG. For example, possible identifiers for method blanks would be DFBLK01, DFBLK02, DFBLKA1, DFBLKB2, DFBLKAB, etc.

3.3.8 Other Common Fields

Other pieces of information are common to many of the data reporting forms. These include "Matrix", "Lab Sample ID", "Lab File ID", "Instrument ID", and "GC Column".

3.3.8.1 For "Matrix", enter "SOIL" for a soil/sediment/sludge sample, "WATER" for an aqueous sample, "TISSUE" for tissue, "OIL" for oil and oil matrix, and "ASH" for fly ash samples.

3.3.8.2 "Lab Sample ID" is an optional laboratory generated internal identifier. Up to 12 alphanumeric characters may be reported here. If the Contractor does not have a Lab Sample ID, this field may be left blank. However, if this identifier is used on any of the forms or accompanying hardcopy data deliverables, it must be reported on all the appropriate forms.

3.3.8.3 "Lab File ID" is the laboratory generated name of the High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) data system file containing information pertaining to a particular analysis. Up to 14 alphanumeric characters may be used here.

3.3.8.4 "Instrument ID" is common to many of the forms, particularly those containing calibration data. The identifier used by the laboratory must include some indication of the manufacturer and/or model of the instrument, and contain additional characters or numbers that differentiate between all instruments of the same type in the laboratory. The instrument identifier must be consistent on all forms within the SDG.

3.3.8.5 "GC Column" and "ID (mm)" are common to various other forms. These two fields are to be used to identify the stationary phase of the GC column, and the internal diameter of the GC column in millimeters (mm).

3.3.9 Rounding Rule

For rounding off numbers to the appropriate level of precision, observe the following common rules. If the figure following those to be retained is less than 5, drop it (round down). If the figure is greater than or equal to 5, drop it and increase the last digit to be retained by 1 (round up).

3.4 Chlorinated Dibenzo-P-Dioxin/Dibenzofuran (CDD/CDF) Data Reporting Forms

3.4.1 CDD/CDF Sample Data Summary [Form I-HR CDD-1]

3.4.1.1 This form is used for tabulating and reporting the sample analysis results for target analytes in samples, blanks, and LCSs. It is related to Form I-HR CDD-2, and for each sample for which there is a Form I-HR CDD-1, there must be a corresponding Form I-HR CDD-2. In addition, a Form I-HR CDD-3 may be associated.

3.4.1.2 Complete all header information according to the instructions in Section 3.3 and as follows:

3.4.1.2.1 Enter the "Matrix" of the sample being analyzed. The designation of matrix must reflect which one of the matrix-specific extraction procedures in Exhibit D was used for extraction of the sample.

3.4.1.2.2 For "Sample wt/vol", enter the number of grams (for soil, tissue, oil, and ash) or milliliters (for water) of sample used in the first blank line, and the units, either "G" or "ML", in the second blank.

3.4.1.2.3 For water samples, indicate the extraction procedure used by entering "SEPF" for Separatory Funnel Extraction or "SPE" for Solid Phase Extraction in the field labeled "Water Sample Prep".

3.4.1.2.4 Enter the actual volume of the most concentrated sample extract, in microliters, under "Concentrated Extract Volume". This volume will typically be 20 µL after the addition of the internal standard solution.

3.4.1.2.5 Enter "GC Column", "ID (mm)", "Lab Sample ID", and "Lab File ID", as described in Section 3.3.

3.4.1.2.6 "Date Received" is the date of sample receipt at the laboratory, as noted on the Chain-of-Custody/Traffic Report (i.e., the Validated Time of Sample Receipt [VTSR]) for that sample. It must be entered as MM/DD/YYYY.

3.4.1.2.7 "Date Extracted" and "Date Analyzed" must also be entered as MM/DD/YYYY.

3.4.1.2.8 "Date Analyzed" must be the date of the analysis for which the results are reported on Form I-HR. (If the sample requires a second column confirmation and is reported on Form I-HR CDD-3, the "Date Analyzed" on Form I-HR CDD-3 must be the date of the second analysis, while the date on Form I-HR CDD-1 and CDD-2 shall be the date of the first analysis.)

3.4.1.2.9 If the sample has been diluted for analysis, enter the "Dilution Factor" as a single number, not a fraction. For example, enter "100.0" for a 1 to 100 dilution of the extract. Enter "0.1" for a concentration of 10 to 1. If the sample was not diluted, enter "1.0".

3.4.1.2.10 Enter the volume of the sample extract injected into the HRGC in the "Injection Volume" field. Report this volume in µL.

3.4.1.2.11 Enter the value for Percent Solid (%S) as described in Exhibit D for soil/sediment/sludge samples in the "% Solid/Lipids" field. For tissue samples, enter the value for Percent Lipids (% Lipids), as determined in Exhibit D, in this field. For all other matrices, leave this field blank.

3.4.1.2.12 The appropriate concentration units, "PG/L" for water samples, or "NG/KG" for all other matrices, must be entered in the field for "CONCENTRATION UNITS".

3.4.1.3 For each analyte detected in a sample, enter the Absolute Retention Time (RT) of the detected peak under "PEAK RT". Enter the RT in minutes and decimal minutes, not seconds or minutes and seconds. The RT must be entered, even if the peak did not meet all of the identification criteria in Exhibit D.

3.4.1.4 Enter the ion abundance ratio for the two m/z's (listed under "Selected Ions") in the column labeled "ION RATIO". If the ion abundance ratio falls outside the acceptance limits listed in Exhibit D, place an asterisk (*) in the column under the number (#) symbol. For target analytes that meet all the identification criteria in Exhibit D, the Contractor shall report the concentrations detected as uncorrected for blank contaminants in the column labeled "CONCENTRATION". Report all results to three significant figures.

3.4.1.5 Under the column labeled "Q" for qualifier, flag each result with the specific data reporting qualifiers listed below. The Contractor is encouraged to use additional flags as needed, but the definition of such flags must be explicit,

must not contradict the qualifiers listed below, and must be included in the accompanying SDG Narrative.

3.4.1.6 For reporting results, the following contract-specific qualifiers are to be used. The seven qualifiers listed below are not subject to modification by the laboratory. Up to five qualifiers may be reported on Form I for each analyte. The seven defined qualifiers to be used are as follows:

3.4.1.6.1 U - Indicates compound was analyzed for, but not detected. The CONCENTRATION column is left blank in this instance, and an Estimated Detection Limit (EDL) must be calculated based on the signal-to-noise (S/N) ratio, as described in Exhibit D. This calculation takes into account the sample weight/volume extracted, the volume of the most concentrated extract, the injection volume, and dilution of the most concentrated extract prior to analysis.

3.4.1.6.2 J - Indicates an estimated value. This flag is used when the mass spectral data indicate the presence of an analyte meeting all the identification criteria in Exhibit D, but the result is less than the Contract Required Quantitation Limit (CRQL), as listed in Exhibit C, but greater than zero.

3.4.1.6.3 B - This flag is used when the analyte is found in the associated blank, as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

3.4.1.6.4 E - This flag identifies analytes whose concentrations exceed the calibration range of the HRGC/HRMS instrument for that specific analysis. If one or more compounds have a response greater than fullscale, except as noted in Exhibit D, a smaller sample size must be extracted and analyzed according to the specifications in Exhibit D. All such compounds with a response greater than full scale should have the concentration flagged "E" on the Form I for the original analysis. If the dilution causes any compounds identified in the first analysis to be below the calibration range in the second analysis, the results of both analyses shall be reported on separate copies of Form I. The Form I for the diluted sample shall have the "DL" suffix appended to the Designated sample number.

3.4.1.6.5 D - This flag indicates all compounds identified in an analysis at a secondary dilution factor. If a smaller sample size is analyzed, as in the "E" flag above, the "DL" suffix is appended to the Designated sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag. This flag alerts data users that any discrepancies between the concentrations reported may be due to dilution of the sample extract.

3.4.1.6.6 H - This flag indicates that the analyte in question was quantitated using peak heights rather than peak areas for both the analyte and its internal standard (see Exhibit D, Section 11).

3.4.1.6.7 X - Other specific flags may be required to properly define the results. If used, they must be fully described, and such description must be attached to the Sample Data Package and the SDG Narrative. Begin using "X". If more than one flag is needed, use "Y" and "Z" as needed. The laboratory-defined flags are limited to the letters "X", "Y", and "Z".

3.4.1.7 The combination of flags "BU" or "UB" is expressly prohibited. Blank contaminants are flagged "B" only when they are detected in the sample associated with the blank.

3.4.1.8 If a peak detected in the sample meets all of the identification criteria except the ion abundance ratio, flag the ion ratio as indicated above, and report the Estimated Maximum Possible Concentration (EMPC), as calculated in Exhibit D under the "EMPC/EDL" column. Do not report the value of the EMPC

under the column labeled "CONCENTRATION", as that column is only for analytes meeting all the identification criteria.

3.4.1.9 If an analyte was not detected in the sample, enter "U" in the qualifier column, as described above, and report the EDL as calculated in Exhibit D under the "EMPC/EDL" column. Do not report the value of the EDL if there is an entry under "CONCENTRATION". The presence of the "U" alerts the data user that the reported value is an EDL, otherwise it is assumed to be an EMPC. EMPC values must be reported with "Peak Retention Times" and "Ion Ratios" with a flag in the "Q" column.

3.4.1.10 The bottom portion of Form I-HR CDD-1 contains the fields for reporting the recoveries of the labeled compounds and the cleanup standard. The recoveries of these standards are crucial in evaluating the effectiveness of the isotope dilution method. For each labeled compound and the cleanup standard, enter the absolute RT of the standard in the sample in minutes and decimal minutes. Report the ion abundance ratio under the "ION RATIO" column. Flag any ion ratios that fall outside the ion ratio limits listed on the form by placing an asterisk (*) in the column under the number (#) symbol. There is no ion abundance ratio for the cleanup standard, as only one ion is monitored. Report the Percent Recovery (%R) of the labeled compounds and the cleanup standard, calculated according to Exhibit D, under the "%REC" column. The Quality Control (QC) limits for recovery are listed on the form. Flag any recovery outside those limits by placing an asterisk (*) under the number (#) symbol in the recovery column. Requirements for re-analysis of samples due to poor recoveries are provided in Exhibit D.

3.4.2 Toxicity Equivalence Summary [Form I-HR CDD-2]

This page of Form I-HR reports the results of the toxicity equivalence calculations for each sample analyzed. The concentration of each of the 2,3,7,8-substituted CDD and CDF isomers is multiplied by a Toxicity Equivalence Factor (TEF) to arrive at an equivalent toxicity concentration of 2,3,7,8-TCDD.

3.4.2.1 Complete the header information as specified in Section 3.3. The header of Form I-HR CDD-2 must match the header of Form I-HR CDD-1 for the same sample.

3.4.2.2 For each 2,3,7,8-substituted isomer positively identified in the sample, enter the concentration found in the column labeled "CONCENTRATION". If an isomer was not detected (e.g., flagged "U" on Form I CDD-1) for the purposes of this calculation, enter 0.0 (zero) (EDLs and EMPCs are entered as 0.0) as the concentration. Multiply each concentration times the TEF listed on the form for that isomer, and enter the product of the two in the column labeled "TEF-ADJUSTED CONCENTRATION". Add all 17 TEF-adjusted concentrations together, including any zeros for non-detected, and enter the total on the line at the bottom of the form.

3.4.3 Second Column Confirmation Results [Form I-HR CDD-3]

This page of Form I reports the results of all second column confirmation analyses performed. The requirements for second column confirmation are discussed in Exhibit D. Each time a second column confirmation is performed, the results are reported on Form I-HR CDD-3. Second column confirmation is not required for LCSs, therefore Form I-HR CDD-3 is not submitted for LCSs.

3.4.3.1 Complete the header information as specified in Section 3.3, except note that the field for "GC Column" must correspond to the second column confirmation analysis (i.e., it must not match that in the header of Form I-HR CDD-1 or CDD-2). Other fields such as "Date Analyzed", "Dilution Factor", and "Lab File ID" may also differ and must correspond to the second column confirmation analysis.

3.4.3.2 Complete the information in the lower portion of the form in a fashion similar to that for Form I-HR CDD-1, but enter the results of the second column confirmation.

3.4.3.3 Enter data on the recovery of the labeled compound and cleanup standard from the second column confirmation analysis in a fashion similar to that for the original analysis.

3.4.4 CDD/CDF Total Homologue Concentration Summary [Form II-HR CDD]

This form reports the total concentration of all CDD/CDF isomers in a given homologue that are detected in the sample, including those isomers that do not represent the 2,3,7,8-substituted isomers of greatest toxicological concern. Because there are many isomers in each homologue, it is necessary to indicate the number of peaks that represent isomers within the congener. Enter the number of peaks detected in each congener under "PEAKS". For instance, if three PeCDD peaks are detected and summed together, enter "3" under "PEAKS".

3.4.4.1 Enter the total concentration of the homologue, as calculated in Exhibit D, under "CONCENTRATION". Enter qualifiers under the "Q" column, as described in Section 3.4.1.6. If no isomers in a homologue were detected, enter "U" as the qualifier, and enter the <u>lowest</u> EDL of any of the 2,3,7,8-substituted isomers under the "EMPC/EDL" column.

3.4.4.2 If <u>any</u> of the peaks in a congener meet all the identification criteria <u>except</u> the ion abundance ratio, report the total concentration as an EMPC under the "EMPC/EDL" column.

3.4.5 CDD/CDF Lab Control Sample Summary [Form III-HR CDD]

This page of Form III reports the results of the LCS analysis.

3.4.5.1 Complete the header information as in Section 3.3. Enter the Designated sample number in the box at the top of the form. Similarly, the Lab Sample ID and Lab File ID must refer to the LCS.

3.4.5.2 Under the "Spike Added" column, enter the calculated concentration of each of the 17 analytes in the LCS in pg/L or ng/Kg (according to the matrix) that results from dividing each spike compound amount added by the aliquot weight or volume. In the column labeled "Amount Recovered", enter the concentration (or EMPC) of each analyte detected in the LCS. The concentration units must be those indicated at the top of the form and be appropriate to the sample matrix listed in the header. Calculate the recovery of each spiked analyte as described in Exhibit D, and enter this value to the nearest whole percentage point in the column labeled "Percent Recovery". Flag any recoveries outside the QC limits listed on the form by placing an asterisk (*) in the column under the number (#) symbol.

3.4.5.3 In addition to Form III CDD, a copy of Form I-HR CDD-1 must also be completed for the LCS analysis, following the procedures described above.

3.4.6 CDD/CDF Method Blank Summary [Form IV-HR CDD]

This form summarizes the samples associated with each method blank analysis. A copy of Form IV-HR is required for each blank.

3.4.6.1 Complete the header information as described in Section 3.3. The Designated sample number entered in the box at the top of the form shall be the number assigned to the method blank. The matrix entered on this form refers to the matrix of the associated samples, as one blank is required each time that samples of a similar matrix are extracted together. Therefore, samples of differing matrices cannot be mixed together on a single Form IV-HR.

3.4.6.2 Summarize the samples associated with a given method blank in the box in the lower portion of the form, entering the Designated sample number, Lab Sample ID, Lab File ID, and date of analysis of each sample. Include LCSs as well.

3.4.7 CDD/CDF Window Defining Mix Summary [Form V-HR CDD-1]

This page of Form V reports the results of the analysis of the WDM that precedes each calibration verification on each GC column and instrument used for analysis. The analysis of this mixture is used to document the retention time window for the CDD/CDF congeners.

3.4.7.1 Complete the header information as described in Section 3.3, entering the Designated sample number of the WDM injection in the box at the top of the form. The header information must correspond to the analysis of the WDM.

3.4.7.2 In the box in the lower portion of the form, enter the Absolute RTs of the first and last eluting isomers in each congener. Enter the retention times in minutes and decimal minutes, not minutes and seconds, nor seconds.

NOTE: As there is only one possible octachlorinated dioxin and furan, the retention times of these analytes are not contained in the WDM, and are not reported here.

3.4.8 CDD/CDF Chromatographic Resolution Summary [Form V-HR CDD-2]

This page of Form V reports the chromatographic resolution of selected analytes in one of two solutions, depending on the GC column. The chromatographic resolution of these analytes is crucial to evaluating the results for the CDDs/CDFs reported in the samples. This evaluation is made every 12 hours during which samples or standards are analyzed. The Form V-HR CDD-2 shall be submitted for each column used.

3.4.8.1 For the DB-5 (or equivalent) column and for the DB-225 (or equivalent) column, the chromatographic resolution is judged from the analysis of the isomer specificity check that precedes the analysis of the calibration verification (see Exhibit D).

3.4.8.2 Complete one copy of Form V-HR CDD-2 for each analysis of the isomer specificity check on each GC column. Complete the header information, as described in Section 3.3, entering the Designated sample number of the isomer specificity check in the box at the top of the form. Enter the date and time of analysis of the standard in the header.

3.4.8.3 Calculate the chromatographic resolution for the GC column identified in the header according to the procedures in Exhibit D. For the DB-5 (or equivalent) column, enter only the results from the isomer specificity check analysis. For the DB-225 (or equivalent) column, enter only the results from the isomer specificity check analysis.

3.4.9 CDD/CDF Analytical Sequence Summary [Form V-HR CDD-3]

This page of Form V reports the sequence of analyses, including the analysis of the WDM, Isomer Specificity Check, the calibration standards, blanks, samples, and LCSs.

3.4.9.1 Complete the header information as described in Section 3.3. Enter the inclusive dates and times of the analyses of the first and last initial calibration standards in the fields for "Init. Calib. Date(s)" and "Init. Calib. Times". Dates must be in the format MM/DD/YYYY, and all times are expressed as HHMM, in military time (i.e., a 24-hour clock).

3.4.9.2 In the box in the lower portion of the form, enter the Designated sample number, Lab Sample ID, Lab File ID, and date and time of analysis of all standards, samples, blanks, LCSs, dilutions, re-analyses, etc. All analyses

must be listed on Form V in chronological order. If analysis is not associated with the SDG being reported, enter the Designated sample number as "ZZZZZZ", as described in Section 3.3.

3.4.9.3 If the analytical sequence includes the analysis of the initial calibration standards, these standards and the WDM must be included on that copy of Form V, identified by the Designated sample numbers described in Section 3.3. A copy of the analytical sequence that includes these initial calibration standards and the WDM must be submitted with each data package to which the initial calibration applies, but the Case number and Task Order number must match those of each data package in which these initial calibration data are reported.

3.4.10 CDD/CDF Initial Calibration Response Factor Summary [Form VI-HR CDD-1]

This form summarizes the Relative Response (RR) or Relative Response Factors (RRF) for each target analyte, labeled compound, and cleanup standard calculated from the initial calibration. Complete the header information as described in Section 3.3. Enter the inclusive initial calibration date(s) and times, as described for Form V-HR CDD-3. One copy of Form VI-HR CDD-1 must be completed for each initial calibration and for each instrument and GC column used for analysis of samples, and must be accompanied by a corresponding Form VI-HR CDD-2.

3.4.10.1 Enter the RR and RRF determined from the analysis of each of the calibration standards (CS1 through CS5). Enter RR/RRF values to three decimal places. Calculate the mean RR/RRF, as described in Exhibit D, and enter the value in the column "MEAN RR/RRF". Calculate the Percent Relative Standard Deviation (%RSD), and enter under "%RSD". Note that as the internal standards are used to determine the RRFs of the labeled compounds, no RRF values can be calculated for the internal standards, and therefore, they do not appear on Form VI CDD-1.

3.4.11 CDD/CDF Initial Calibration Ion Abundance Ratio Summary [Form VI-HR CDD-2]

This page of Form VI reports the ion abundance ratios for each of the initial calibration standards. Because the ratio of the abundances of the two ions monitored for each analyte is crucial to the identification of these analytes, the ion abundance ratios must meet the QC limits.

3.4.11.1 For each native analyte, labeled compound, and internal standard, the two ions monitored for each analyte are listed in the column labeled "Selected Ions". Calculate the ratio of the abundances of these two ions and enter the ion abundance ratio of each analyte in each of the initial calibration standards to two decimal places.

3.4.11.2 Compare the ion abundance ratios to the QC limits shown on the form, and flag any analyte which did not meet these limits in one or more of the standards.

NOTE: The cleanup standard does not appear on Form VI-HR CDD-2, as only one ion is monitored for this analyte. Therefore, no ion abundance ratio can be calculated.

3.4.11.3 One copy of Form VI-HR CDD-2 must be completed for each initial calibration, for each instrument and GC column used for analysis of samples, and must accompany a corresponding copy of Form VI CDD-1.

3.4.12 CDD/CDF Continuing Calibration Summary [Form VII-HR CDD-1]

This page of Form VII summarizes the results of the continuing calibration that must occur in each 12-hour analytical sequence. The form is used to report the RR/RRF values and ion abundance ratios of each analyte in the CS3 standard, and to compare these values to the initial calibration data reported on Form VI-HR CDD-1.

3.4.12.1 One copy of Form VII-HR CDD-1 must be completed for each continuing calibration performed, and must be accompanied by a corresponding copy of Form VII-HR CDD-2.

3.4.12.2 Complete the header information as described in Section 3.3. The date and time of analysis and Lab File ID in the header must correspond to the analysis of the CS3 standard. Enter the dates and times of the associated initial calibration in the fields for "Init. Calib. Date(s)" and "Init. Calib. Times", respectively. If the calendar date changed during the initial calibration, enter the inclusive dates of the first and last standards in the associated initial calibration in the fields for "Init. Calib. Date(s)".

3.4.12.3 For each of the native analytes, labeled compounds, and the cleanup standard in the CS3 Standard, enter the RR or RRF determined from the analysis of the continuing calibration standard in the column labeled "RR/RRF". Enter the mean RR/RRF for each analyte from the associated initial calibration, in the column labeled "MEAN RR/RRF". The values reported in this column must match those reported on the Form VI for the associated initial calibration. Calculate the Percent Difference (%D) between the RR/RRF and the mean RR/RRF for each analyte, and report under "%D". If the Percent Difference exceeds the quality control limits specified in Exhibit D, flag that analyte by placing an asterisk (*) in the "%D FLAG" column. Report the ion abundance ratio of each analyte under the "ION RATIO" column. Flag any ion ratio that falls outside the QC limits shown on the form by placing an asterisk (*) in the "ION RATIO FLAG" column.

NOTE: Because only one ion is monitored for the cleanup standard, no ion ratio is determined for this analyte. For the internal standards, RRFs are not calculated or reported on Form VII-HR CDD-1, but the ion abundance ratios for these standards must be reported on Form VII-HR CDD-1.

3.4.13 CDD/CDF Continuing Calibration Retention Time Summary [Form VII-HR CDD-2]

This page of Form VII summarizes the RT and Relative Response Times (RRTs) of the analytes in the continuing calibration standards that must be analyzed in each 12-hour analytical sequence. RTs and RRTs are critical to the identification of CDDs/CDFs by this method. One copy of Form VII-HR CDD-2 must be completed for each continuing calibration performed and must be accompanied by a corresponding copy of Form VII-HR CDD-1.

3.4.13.1 Complete the header information as described in Section 3.3. The date and time of analysis and Lab File ID in the header must correspond to the analysis of the CS3 standard. Enter the date of the associated initial calibration in the field for "Init. Calib. Date(s)". If the calendar date changed during the initial calibration, enter the inclusive dates of the analyses of the first and last standards in the associated initial calibration in the fields for "Init. Calib. Date(s)".

3.4.13.2 For each of the native and labeled analytes, enter the RRT and RT of the analyte in the calibration standard. RRT is calculated as the RT of the native analyte divided by the RT of the appropriate labeled compound, and the RT of the labeled compound divided by the RT of the appropriate internal standard. For the internal standards, report only the RTs. Enter all RTs in minutes and decimal minutes. RRTs are reported to two decimal places.

3.5 Sample Log-In Sheet [Form DC-1]

This form documents the receipt and inspection of sample containers and samples. One original of Form DC-1 is required for each sample shipping container. If the samples in a single sample shipping container must be assigned to more than one SDG, the original Form DC-1 shall be placed with the deliverables for the lowest alpha numeric SDG number, and a copy of Form DC-1 must be placed with the deliverables for the other SDG(s). The copies should be identified as "copy(ies)", and the location of the original should be noted on the copies.

3.5.1 Sign and date the airbill (if present). Examine the shipping container and record the presence/absence of custody seals and their condition (e.g., intact, broken) in Item 1 of Form DC-1. Record the custody seal numbers in Item 2.

3.5.2 Open the container, remove the enclosed sample documentation, and record the presence/absence of a Chain-of-Custody record(s), Chain-of-Custody/Traffic Reports, packing lists, and airbills or airbill stickers in Items 3-5. Specify if there is an airbill present or an airbill sticker in Item 5. Record the airbill or sticker number in Item 6.

3.5.3 Remove the samples from the shipping container(s), examine the samples and the sample tags (if present), and record the condition of the sample bottles (e.g., intact, broken, leaking) and presence or absence of sample tags in Items 7 and 8.

3.5.4 Review the sample shipping documents and complete the header information as described in Section 3.3. Report the temperature of the cooler under Item 9. Compare the information recorded on all the documents and samples and circle the appropriate answer in Item 10.

3.5.5 If there are no problems observed during sample receipt, sign and date (include time) Form DC-1, the Chain-of-Custody record, and the Traffic Report, and write the sample numbers on Form DC-1. Record the appropriate sample tags and assigned laboratory numbers, if applicable. The log-in date should be recorded at the top of Form DC-1 and the date and time of cooler receipt at the laboratory should be recorded in Items 11 and 12. Record the specific area designation (e.g., refrigerator number) in the Sample Transfer block located in the bottom left corner of Form DC-1. Sign and date the Sample Transfer block. Cross out unused columns and spaces.

3.5.6 If there are problems observed during sample receipt or an answer marked with an asterisk (e.g., "absent*") was circled, contact the TOPO and document the contact and the resolution of the problem on a Communication Log. Following resolution, sign and date the forms as specified in the preceding paragraph and note, where appropriate, the resolution of the problem.

3.6 CDD/CDF Complete SDG File (CSF) Inventory Sheet [Form DC-2]

This form is used to record the inventory of the CSF documents and the count of documents in the original Sample Data Package that is sent to the TOPO.

3.6.1 Organize all CSF documents, as described in Section 2. Assemble the documents in the order specified on Form DC-2 (high resolution) and Section 2, and stamp each page with a consecutive number. (Do not number the DC-2 form.) Inventory the CSF by reviewing the document numbers and recording page number ranges in the columns provided in the Form DC-2 (high resolution). If there are no documents for a specific document type, enter "NA" in the empty space.

3.6.2 Certain laboratory-specific documents related to the CSF may not fit into a clearly-defined category. The laboratory should review Form DC-2 (high resolution) to determine if it is most appropriate to place them under Item 5, 6, 7, or 8. Item 8 should be used if there is no appropriate previous item. These types of documents should be described or listed in the blanks under each appropriate item.

4.0 DATA REPORTING FORMS

The data reporting forms are shown on the following pages.

USEPA

1DFA
CDD/CDF SAMPLE DATA SUMMARY
HIGH RESOLUTION

EPA SAMPLE NO.

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ TO No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil)_____ Lab Sample ID: _____

Sample wt/vol: _____(g/ml)_____ Lab File ID: _____
Water Sample Prep: _____(SEPF/SPE) Date Received: _____
Concentrated Extract Volume: _____(uL) Date Extracted:_____
Injection Volume: ____(uL) % Solid/Lipids: _____ Date Analyzed: _____
GC Column: _____ ID: _____(mm) Dilution Factor: _____

CONCENTRATION UNITS: (pg/L or ng/Kg) _____

TARGET ANALYTE	SELECTED IONS	PEAK RT	ION RATIO #	CONCENTRATION	Q	EMPC/EDL
2378-TCDD	320/322					
2378-TCDF	304/306					
12378-PeCDF	340/342					
12378-PeCDD	356/358					
23478-PeCDF	340/342					
123478-HxCDF	374/376					
123678-HxCDF	374/376					
123478-HxCDD	390/392					
123678-HxCDD	390/392					
123789-HxCDD	390/392					
234678-HxCDF	374/376					
123789-HxCDF	374/376					
1234678-HpCDF	408/410					
1234678-HpCDD	424/426					
1234789-HpCDF	408/410					
OCDD	458/460					
OCDF	442/444					

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Levels (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	SELECTED IONS	PEAK RT	ION RATIO #	ION RATIO LIMITS	% REC #	RECOVERY LIMITS
13C-2378-TCDD	332/334			0.65-0.89		25-164
13C-12378-PeCDD	368/370			1.32-1.78		25-181
13C-123478-HxCDD	402/404			1.05-1.43		32-141
13C-123678-HxCDD	402/404			1.05-1.43		28-130
13C-1234678-HpCDD	424/426			0.88-1.20		23-140
13C-OCDD	470/472			0.76-1.02		17-157
13C-2378-TCDF	316/318			0.65-0.89		24-169
13C-12378-PeCDF	352/354			1.32-1.78		24-185
13C-23478-PeCDF	352/354			1.32-1.78		21-178
13C-123478-HxCDF	384/386			0.43-0.59		26-152
13C-123678-HxCDF	384/386			0.43-0.59		26-123
13C-123789-HxCDF	384/386			0.43-0.59		29-147
13C-234678-HxCDF	384/386			0.43-0.59		28-136
13C-1234678-HpCDF	418/420			0.37-0.51		28-143
13C-1234789-HpCDF	418/420			0.37-0.51		26-138
37C1-2378-TCDD	328/NA		NA	NA		35-197

Column to be used to flag values outside QC limits.

USEPA

1DFB
CDD/CDF TOXICITY EQUIVALENCE SUMMARY
HIGH RESOLUTION

EPA SAMPLE NO.

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ TO No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil/ _____ Lab Sample ID: _____

Sample wt/vol: _____(g/ml)_____ Lab File ID: _____

Water Sample Prep: _____(SEPF/SPE) Date Received: _____

Concentrated Extract Volume: _____(uL) Date Extracted:_____
Injection Volume: ____(uL) % Solid/Lipids: _____ Date Analyzed: _____

GC Column: _____ ID: _____ (mm) Dilution Factor: _____

CONCENTRATION UNITS: (pg/L or ng/Kg) _____

TARGET ANALYTE	CONCENTRATION	TEF*	TEF-ADJUSTED CONCENTRATION
2378-TCDD		x 1.0 =	
2378-TCDF		x 0.1 =	
12378-PeCDF		x 0.05 =	
12378-PeCDD		x 0.5 =	
23478-PeCDF		x 0.5 =	
123478-HxCDF		x 0.1 =	
123678-HxCDF		x 0.1 =	
123478-HxCDD		x 0.1 =	
123678-HxCDD		x 0.1 =	
123789-HxCDD		x 0.1 =	
234678-HxCDF		x 0.1 =	
123789-HxCDF		x 0.1 =	
1234678-HpCDF		x 0.01 =	
1234678-HpCDD		x 0.01 =	
1234789-HpCDF		x 0.01 =	
OCDD		x 0.001 =	
OCDF		x 0.001 =	
		Total =	

* TEF - Toxicity Equivalent Factors from EPA/625/3-89/016 March 1989 - Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans (CDDs and CDFs) and 1989 Update.

USEPA

1DFC
CDF SECOND COLUMN CONFIRMATION
HIGH RESOLUTION

EPA SAMPLE NO.

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ TO No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil _____ Lab Sample ID: _____

Sample wt/vol: _____(g/ml)_____ Lab File ID: _____
Water Sample Prep: _____(SEPF/SPE) Date Received: _____
Concentrated Extract Volume: _____(uL) Date Extracted:_____
Injection Volume: ____(uL) % Solid/Lipids: _____ Date Analyzed: _____

GC Column: _____ ID: _____(mm) Dilution Factor: _____

CONCENTRATION UNITS: (pg/L or ng/Kg) _____

ANALYTE	SELECTED IONS	PEAK RT	ION RATIO #	CONCENTRATION	Q	EMPC/EDL
2378-TCDF	304/306					

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with % Lipids).

LABELED COMPOUNDS	SELECTED IONS	PEAK RT	ION RATIO #	ION RATIO LIMITS	% REC #	RECOVERY LIMITS
13C-2378-TCDF	316/318			0.65-0.89		24-169
37Cl-2378-TCDD	328/NA		NA	NA		35-197

Column to be used to flag values outside Quality Control (QC) limits.

USEPA

2DF EPA SAMPLE NO.

CDD/CDF TOTAL HOMOLOGUE CONCENTRATION SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ TO No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil) _____ Lab Sample ID: _____

Sample wt/vol: _____(g/ml)_____ Lab File ID: _____

Water Sample Prep: _____(SEPF/SPE) Date Received: _____

Concentrated Extract Volume: _____(uL) Date Extracted:_____

Injection Volume: ____(uL) % Solid/Lipids: _____ Date Analyzed: _____

GC Column: _____ ID: _____(mm) Dilution Factor: _____

CONCENTRATION UNITS: (pg/L or ng/Kg) _____

HOMOLOGUE	PEAKS	CONCENTRATION	Q	EMPC/EDL
DIOXINS				
Total TCDD				
Total PeCDD				
Total HxCDD				
Total HpCDD				
FURANS				
Total TCDF				
Total PeCDF				
Total HxCDF				
Total HpCDF				

NOTE: Concentrations, Estimated Maximum Possible Concentrations (EMPCs), and Estimated Detection Limits (EDLs) for solid samples are calculated on a dry weight basis (except tissues, which are reported on a wet weight basis with %Lipids). The total homologue concentrations do not affect the TEF (Toxicity Equivalent Factor) calculations.

USEPA

3DFA

EPA SAMPLE NO.

CDD/CDF LAB CONTROL SAMPLE SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil) _____ Lab Sample ID: _____

Sample wt/vol: _____(g/ml)_____ Lab File ID: _____

Water Sample Prep: _____(SEPF/SPE) Date Received: _____

Concentrated Extract Volume: _____(uL) Date Extracted:_____

Injection Volume: ____(uL) Date Analyzed: _____

GC Column: _____ ID: _____(mm) Dilution Factor: _____

CONCENTRATION UNITS: (pg/L or ng/Kg) _____

SPIKE ANALYTE	SPIKE ADDED	AMOUNT RECOVERED	PERCENT RECOVERY	#	QC LIMITS
2378-TCDD					67-158
2378-TCDF					75-158
12378-PeCDF					80-134
12378-PeCDD					70-142
23478-PeCDF					68-160
123478-HxCDF					72-134
123678-HxCDF					84-130
123478-HxCDD					70-164
123678-HxCDD					76-134
123789-HxCDD					64-162
234678-HxCDF					70-156
123789-HxCDF					78-130
1234678-HpCDF					82-132
1234678-HpCDD					70-140
1234789-HpCDF					78-138
OCDD					78-144
OCDF					63-170

Column to be used to flag values outside Quality Control (QC) limits.

Laboratory Control Sample Recovery: _____ Outside limits out of _____ total.

USEPA

4DF
CDD/CDF METHOD BLANK SUMMARY
HIGH RESOLUTION

EPA SAMPLE NO.

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

Matrix: (soil/water/ash/tissue/oil) _____ Lab Sample ID: _____

Water Sample Prep: _____(SEPF/SPE) Lab File ID: _____

GC Column: _____ ID: _____(mm) Date Extracted:_____

Instrument ID: _____ Date Analyzed: _____

THIS METHOD BLANK APPLIES TO LABORATORY CONTROL SAMPLES (LCSs).

EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED

USEPA

5DFA

EPA SAMPLE NO.

CDD/CDF WINDOW DEFINING MIX (WDM) SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Lab File ID: _____

Instrument ID: _____ Date Analyzed: _____

Time Analyzed: _____

CDD/CDF	RT FIRST ELUTING	RT LAST ELUTING
TCDD		
TCDF		
PeCDD		
PeCDF		
HxCDD		
HxCDF		
HpCDD		
HpCDF		

USEPA

5DFB

EPA SAMPLE NO.

CDD/CDF CHROMATOGRAPHIC RESOLUTION SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Lab File ID: _____

Instrument ID: _____ Date Analyzed: _____

Time Analyzed: _____

Percent Valley determination for DB-5 (or equivalent) column -
For the column performance solution beginning the 12-hour period:

1238-TCDD/2378-TCDD: _____

QUALITY CONTROL (QC) LIMITS:

Percent Valley between the TCDD isomers must be less than or equal to 25%.

Percent Valley Determination for DB-225 (or equivalent) column -
For the column Performance Solution beginning the 12-hour period:

2347-TCDF/2378-TCDF: _____

QC LIMITS:

Percent Valley between the TCDD/TCDF isomers must be less than or equal to 25%.

USEPA

5DFC
CDD/CDF ANALYTICAL SEQUENCE SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Instrument ID: _____
Init. Calib. Date(s): _____ _____

Init. Calib. Times: _____ _____

THE ANALYTICAL SEQUENCE OF STANDARDS, SAMPLES, BLANKS, AND LABORATORY CONTROL SAMPLES (LCSs) IS AS FOLLOWS:

EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED

USEPA

6DFA
CDD/CDF INITIAL CALIBRATION RESPONSE FACTOR SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Instrument ID: _____
Init. Calib. Date(s): _____ _____

Init. Calib. Time(s): _____ _____

TARGET ANALYTES	RR/RRF					MEAN RR/RRF	%RSD	QC LIMITS
	CS1	CS2	CS3	CS4	CS5			
2378-TCDD								± 20%
2378-TCDF								± 20%
12378-PeCDF								± 20%
12378-PeCDD								± 20%
23478-PeCDF								± 20%
123478-HxCDF								± 20%
123678-HxCDF								± 20%
123478-HxCDD								± 20%
123678-HxCDD								± 20%
123789-HxCDD[1]								± 20%
234678-HxCDF								± 20%
123789-HxCDF								± 20%
1234678-HpCDF								± 20%
1234678-HpCDD								± 20%
1234789-HpCDF								± 20%
OCDD								± 20%
OCDF[2]								± 20%
LABELED COMPOUNDS								
13C-2378-TCDD								± 35%
13C-12378-PeCDD								± 35%
13C-123478-HxCDD								± 35%
13C-123678-HxCDD								± 35%
13C-1234678-HpCDD								± 35%
13C-OCDD								± 35%
13C-2378-TCDF								± 35%
13C-12378-PeCDF								± 35%
13C-23478-PeCDF								± 35%
13C-123478-HxCDF								± 35%
13C-123678-HxCDF								± 35%
13C-123789-HxCDF								± 35%
13C-234678-HxCDF								± 35%
13C-1234678-HpCDF								± 35%
13C-1234789-HpCDF								± 35%
37C1-2378-TCDD								± 35%

[1]The Relative Response (RR) is calculated based on the labeled analogs of the other two HxCDDs.

[2]The RR is calculated based on the labeled analog of OCDD.

USEPA

6DFB
CDD/CDF INITIAL CALIBRATION ION ABUNDANCE RATIO SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Instrument ID: _____
Init. Calib. Date(s): _____ _____

Init. Calib. Time(s): _____ _____

TARGET ANALYTES	SELECTED IONS	ION ABUNDANCE RATIO					FLAG	ION RATIO QC LIMITS
		CS1	CS2	CS3	CS4	CS5		
2378-TCDD	320/322							0.65-0.89
2378-TCDF	304/306							0.65-0.89
12378-PeCDF	340/342							1.32-1.78
12378-PeCDD	356/358							1.32-1.78
23478-PeCDF	340/342							1.32-1.78
123478-HxCDF	374/376							1.05-1.43
123678-HxCDF	374/376							1.05-1.43
123478-HxCDD	390/392							1.05-1.43
123678-HxCDD	390/392							1.05-1.43
123789-HxCDD	390/392							1.05-1.43
234678-HxCDF	374/376							1.05-1.43
123789-HxCDF	374/376							1.05-1.43
1234678-HpCDF	408/410							0.88-1.20
1234678-HpCDD	424/426							0.88-1.20
1234789-HpCDF	408/410							0.88-1.20
OCDD	458/460							0.76-1.02
OCDF	442/444							0.76-1.02
LABELED COMPOUNDS								
13C-2378-TCDD	332/334							0.65-0.89
13C-12378-PeCDD	368/370							1.32-1.78
13C-123478-HxCDD	402/404							1.05-1.43
13C-123678-HxCDD	402/404							1.05-1.43
13C-1234678-HpCDD	436/438							0.88-1.20
13C-OCDD	470/472							0.76-1.02
13C-2378-TCDF	316/318							0.65-0.89
13C-12378-PeCDF	352/354							1.32-1.78
13C-23478-PeCDF	352/354							1.32-1.78
13C-123478-HxCDF	384/386							0.43-0.59
13C-123678-HxCDF	384/386							0.43-0.59
13C-123789-HxCDF	384/386							0.43-0.59
13C-234678-HxCDF	384/386							0.43-0.59
13C-1234678-HpCDF	418/420							0.37-0.51
13C-1234789-HpCDF	418/420							0.37-0.51
INTERNAL STANDARDS								
13C-1234-TCDD	332/334							0.65-0.89
13C-123789-HxCDD	402/404							1.05-1.43

Quality Control (QC) limits represent ± 15% window around the theoretical ion abundance ratio. The laboratory must flag any analyte in any calibration solution

which does not meet the ion abundance ratio QC limit by placing an asterisk in the flag column.

USEPA

7DFA
CDD/CDF CONTINUING CALIBRATION SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Instrument ID: _____
Lab File ID: _____ Date Analyzed: _____ Time Analyzed: _____
Init. Calib. Times: _____ _____ Init. Calib. Date(s): _____ _____

TARGET ANALYTES	SELECTED IONS	RR/ RRF	MEAN RR/ RRF	%D	%D FLAG	ION RATIO	ION RATIO FLAG	ION RATIO QC LIMITS
2378-TCDD	320/322							0.65-0.89
2378-TCDF	304/306							0.65-0.89
12378-PeCDF	340/342							1.32-1.78
12378-PeCDD	356/358							1.32-1.78
23478-PeCDF	340/342							1.32-1.78
123478-HxCDF	374/376							1.05-1.43
123678-HxCDF	374/376							1.05-1.43
123478-HxCDD	390/392							1.05-1.43
123678-HxCDD	390/392							1.05-1.43
123789-HxCDD	390/392							1.05-1.43
234678-HxCDF	374/376							1.05-1.43
123789-HxCDF	374/376							1.05-1.43
1234678-HpCDF	408/410							0.88-1.20
1234678-HpCDD	424/426							0.88-1.20
1234789-HpCDF	408/410							0.88-1.20
OCDD	458/460							0.76-1.02
OCDF	442/444							0.76-1.02
LABELED COMPOUNDS								
13C-2378-TCDD	332/334							0.65-0.89
13C-12378-PeCDD	368/370							1.32-1.78
13C-123478-HxCDD	402/404							1.05-1.43
13C-123678-HxCDD	402/404							1.05-1.43
13C-1234678-HpCDD	424/426							0.88-1.20
13C-OCDD	470/472							0.76-1.02
13C-2378-TCDF	316/318							0.65-0.89
13C-12378-PeCDF	352/354							1.32-1.78
13C-23478-PeCDF	352/354							1.32-1.78
13C-123478-HxCDF	384/386							0.43-0.59
13C-123678-HxCDF	384/386							0.43-0.59
13C-123789-HxCDF	384/386							0.43-0.59
13C-234678-HxCDF	384/386							0.43-0.59
13C-1234678-HpCDF	418/420							0.37-0.51
13C-1234789-HpCDF	418/420							0.37-0.51
CLEAN-UP								
37C1-2378-TCDD	328/NA					NA	NA	NA
INTERNAL STANDARDS								
13C-1234-TCDD	332/334	NA	NA	NA	NA			0.65-0.89
13C-123789-HxCDD	402/404	NA	NA	NA	NA			1.05-1.43

The laboratory must flag any analyte which does not meet criteria for Percent Difference (%D) or ion abundance ratio by placing an asterisk in the appropriate flag column.

USEPA

7DFB
CDD/CDF CONTINUING CALIBRATION RETENTION TIME SUMMARY
HIGH RESOLUTION

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ T.O. No.: _____ SDG No.: _____

GC Column: _____ ID: _____(mm) Instrument ID: _____
Date Analyzed: _____ Time Analyzed: _____

Lab File ID: _____ Init. Calib. Date(s): _____ _____

TARGET ANALYTES	RRT	RT
2378-TCDD		
2378-TCDF		
12378-PeCDF		
12378-PeCDD		
23478-PeCDF		
123478-HxCDF		
123678-HxCDF		
123478-HxCDD		
123678-HxCDD		
123789-HxCDD		
234678-HxCDF		
123789-HxCDF		
1234678-HpCDF		
1234678-HpCDD		
1234789-HpCDF		
OCDD		
OCDF		
LABELED COMPOUNDS		
13C-2378-TCDD		
13C-12378-PeCDD		
13C-123478-HxCDD		
13C-123678-HxCDD		
13C-1234678-HpCDD		
13C-OCDD		
13C-2378-TCDF		
13C-12378-PeCDF		
13C-23478-PeCDF		
13C-123478-HxCDF		
13C-123678-HxCDF		
13C-123789-HxCDF		
13C-234678-HxCDF		
13C-1234678-HpCDF		
CLEAN-UP STANDARD		
37Cl-2378-TCDD	NA	
INTERNAL STANDARD		
13C-1234-TCDD	NA	
13C-123789-HxCDD	NA	

RRT = (RT of analyte)/(RT of appropriate labeled compound).

CDD/CDF
SAMPLE LOG-IN SHEET (DC-1)

Lab Name					Page ____ of _____
Received By (Print Name)					Log-in Date
Received By (Signature)					
Contract No.					T.O. Number
Case Number		Sample Delivery Group No.			
Remarks:		EPA Sample #	Corresponding Sample Tag #	Corresponding Assigned Lab #	Remarks: Condition of Sample Shipment, etc.
1. Custody Seal(s)	Present/Absent* Intact/Broken				
2. Custody Seal Nos.	_____ _____				
3. Chain-of-Custody Records	Present/Absent*				
4. Traffic Reports or Packing Lists	_____ _____				
5. Airbill	Airbill/Sticker Present/Absent*				
6. Airbill No.	_____ _____				
7. Sample Tags	Present/Absent*				
Sample Tag Numbers	Listed/Not Listed on Chain-of-Custody				
8. Sample Condition	Intact/Broken*/ Leaking				
9. Cooler Temperature	_____				
10. Does information on custody records and sample tags agree?	Yes/No*				
11. Date Received at Laboratory	_____				
12. Time Received	_____				
Sample Transfer					
Fraction	Fraction				
Area #	Area #				
By	By				
On	On				

* Contact SMO and attach record of resolution.

Reviewed By	Logbook No.
Date	Logbook Page No.

CDD/CDF COMPLETE SDG FILE (CSF) INVENTORY SHEET

LABORATORY NAME _____

CITY/STATE _____

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____

CLIENT NO. _____

CONTRACT NO. _____

SOW NO. _____

All documents delivered in the Complete SDG File must be original documents where possible. (Reference - Exhibit B Section 2.6)

	PAGE NOs.		CHECK	
	FROM	TO	LAB	EPA
1. **Inventory Sheet** (DC-2) (Do not number)	____	____	____	____
2. **SDG Narrative**	____	____	____	____
3. **Traffic Report**	____	____	____	____
4. **CDD/CDF Data**				
a. Sample Data				
Sample Data Summary (Form I-HR CDD-1)	____	____	____	____
Toxicity Equivalence Summary (Form I-HR CDD-2)	____	____	____	____
Second Column confirmation Summary (Form I-HR CDD-3)	____	____	____	____
Selected Ion Current Profile (SICP) for each sample	____	____	____	____
Quantitation Reports and Area Summaries	____	____	____	____
Total Homologue Concentration Summary (Form II-HR CDD)	____	____	____	____
b. Quality Control Data				
Lab Control Sample Summary (Form III-HR CDD-1)	____	____	____	____
Lab Control Sample Duplicate Summary (Form III-HR CDD-2)	____	____	____	____
Method Blank Summary (Form IV-HR CDD)	____	____	____	____
Window Defining Mix Summary (Form V-HR CDD-1)	____	____	____	____
Chromatographic Resolution Summary (Form V-HR CDD-2)	____	____	____	____
Analytical Sequence Summary (Form V-HR CDD-3)	____	____	____	____
c. Calibration Data				
Initial Calibration Data (Form VI-HR CDD-1 and Form VI-HR CDD-2), PFK mass resolution, CDD/CDF standard(s) SICPs, Quantitation Reports, and Area Summaries for the initial (five-point) calibration	____	____	____	____
Continuing Calibration Data (Form VII-HR CDD-1 and Form VII-HR CDD-2), PFK mass resolution, SICPs, Quantitation Reports, and Area Summaries	____	____	____	____
d. Raw Quality Control Data				

	PAGE NOs.		CHECK	
	FROM	TO	LAB	EPA
Blank Data Form I-HR CDD-1, CDD-2, CDD-3 (if applicable)	____	____	____	____
Blank Data including SICPs, Quantitation Reports, and Area Summaries for each blank analyzed	____	____	____	____
LCS Form I-HR CDD-1 and CDD-2	____	____	____	____
LCS Data including SICPs, Quantitation Reports, and Area Summaries	____	____	____	____
5. **Miscellaneous Data**				
Original preparation and analysis forms or copies of preparation and analysis logbook pages	____	____	____	____
Internal sample and sample extract transfer Chain-of-Custody records	____	____	____	____
Screening records	____	____	____	____
All instrument output, including strip charts from screening activities (describe or list)				
_____				
_____				
_____	____	____	____	____
6. **EPA Shipping/Receiving Documents**				
Airbills (No. of shipments _____)	____	____	____	____
Chain-of-Custody Records	____	____	____	____
Sample Tags	____	____	____	____
Sample Log-In Sheet (Lab & DC-1)	____	____	____	____
Traffic Report Cover Sheet	____	____	____	____
Miscellaneous Shipping/Receiving Records (describe or list)				
_____				
_____				
_____	____	____	____	____
7. **Internal Lab Sample Transfer Records and Tracking Sheets**				
(Describe or list)				
_____				
_____				
_____	____	____	____	____
8. **Other Records** (describe or list)				
Telephone Communication Log				
_____				
_____				
_____	____	____	____	____

9. **Comments:** _____

_____

_____

_____

Completed by:

(CLP Lab) _____ _____ _____

(Signature) (Print Name & Title) (Date)

Audited by:

(USEPA) _____ _____ _____

(Signature) (Print Name & Title) (Date)

ATTACHMENT 3

SOW - EXHIBIT C - TARGET COMPOUND LIST & CONTRACT REQUIRED QUANTITATION LIMITS

EXHIBIT C

TARGET COMPOUND LIST (TCL)
AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

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EXHIBIT C - TARGET COMPOUND LIST AND CONTRACT REQUIRED QUANTITATION LIMITS

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1.0 CHLORINATED DIBENZO-P-DIOXIN/CHLORINATED DIBENZOFURAN (CDD/CDF) TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

CDD/CDF	CAS No.	WATER (pg/L)	SOLIDS* (ng/Kg)
2378-TCDD	1746-01-6	10	1.0
12378-PeCDD	40321-76-4	50	5.0
123678-HxCDD	57653-85-7	50	5.0
123478-HxCDD	39227-28-6	50	5.0
123789-HxCDD	19408-74-3	50	5.0
1234678-HpCDD	35822-46-9	50	5.0
OCDD	3268-87-9	100	10
2378-TCDF	51207-31-9	10	1.0
12378-PeCDF	57117-41-6	50	5.0
23478-PeCDF	57117-31-4	50	5.0
123678-HxCDF	57117-44-9	50	5.0
123789-HxCDF	72918-21-9	50	5.0
123478-HxCDF	70648-26-9	50	5.0
234678-HxCDF	60851-34-5	50	5.0
1234678-HpCDF	67562-39-4	50	5.0
1234789-HpCDF	55673-89-7	50	5.0
OCDF	39001-02-0	100	10

* Solids include soil, sediment, sludge, tissue (no human tissue), ash, oil, and oil matrices.

NOTE: The values in these tables are quantitation limits, not absolute detection limits. The amount of material necessary to produce a detector response that can be identified and reliably quantified is greater than that needed to be simply detected above the background noise. The quantitation limits in these tables are set at the concentrations in the sample equivalent to the concentration of the lowest calibration standard analyzed for each analyte.

Specific quantitation limits are highly matrix-dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

These CRQL values are based on the analysis of samples according to the specifications given in Exhibit D. Sample data are reported on a dry weight basis for all non-aqueous samples (except tissues which are reported on a wet weight basis, along with their Percent Lipid [% Lipid] content).

2.0 TOTAL HOMOLOGUES

Data are reported for the total concentration of all detected chlorinated dibenzo-p-dioxins (CDDs) or chlorinated dibenzofurans (CDFs) in the following homologues. However, because the number of non-2,3,7,8-substituted isomers that might be detected in a sample is unpredictable, it is not possible to assign Contract Required Quantitation Limits (CRQLs) values to the total homologue concentrations.

Homologue	CAS No.	No. of Possible Isomers	No. of 2,3,7,8-Substituted Isomers
Total TCDD	41903-57-5	22	1
Total PeCDD	36088-22-9	14	1
Total HxCDD	34465-46-8	10	3
Total HpCDD	37871-00-4	2	1
Total TCDF	55722-27-5	38	1
Total PeCDF	30402-15-4	28	2
Total HxCDF	55684-94-1	16	4
Total HpCDF	38998-75-3	4	2

There is only one isomer in both the OCDD and OCDF homologues, hence the total concentration is the same as the 2,3,7,8-substituted concentration.

Homologue		Definition
TCDD	=	Tetrachlorinated dibenzo-p-dioxin
TCDF	=	Tetrachlorinated dibenzofuran
PeCDD	=	Pentachlorinated dibenzo-p-dioxin
PeCDF	=	Pentachlorinated dibenzofuran
HxCDD	=	Hexachlorinated dibenzo-p-dioxin
HxCDF	=	Hexachlorinated dibenzofuran
HpCDD	=	Heptachlorinated dibenzo-p-dioxin
HpCDF	=	Heptachlorinated dibenzofuran
OCDD	=	Octachlorinated dibenzo-p-dioxin
OCDF	=	Octachlorinated dibenzofuran

ATTACHMENT 4

SOW - EXHIBIT D - ANALYTICAL METHODS

EXHIBIT D

ANALYTICAL METHODS FOR CHLORINATED DIBENZO-P-DIOXINS (CDDs)
AND CHLORINATED DIBENZOFURANS (CDFs)

Exhibit D - Analytical Methods for Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs)

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1.0 SCOPE AND APPLICATION

1.1 Method

The analytical method that follows is designed for the determination of tetra through octa chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) (see Table 1) in water, soil, sediment, sludge, tissue, ash, oil and oil matrices by High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS). The method is based on USEPA Method 1613, Revision B and SW-846 Method 8290(Revision 0). Modifications may be requested in individual Task Orders.

1.2 Quantitation Levels

The detection limits and quantitation levels in this method are usually dependent on the level of interferences rather than instrumental limitations. The levels listed in Exhibit C are the Contract Required Quantitation Limits (CRQLs) that can be determined with no interferences present.

1.3 Qualitative Identification

The qualitative identification criteria (see Section 11.1) include requirements for Retention Times (RTs) and limits on the ratio of the abundance of the two intense specified ions produced by each compound. In the instance where a signal is detected that meets all of the qualitative identification criteria except the ion abundance ratio, the method requires calculation of an Estimated Maximum Possible Concentration (EMPC). The presence of interferences that coelute with the compounds of interest may cause the ion abundance ratio to fall outside the limits for qualitative identification and would also affect the quantitative results. The EMPC is a worst case estimate of the sample concentration that the signal would represent if it did meet all the identification criteria (see Section 11.2.6).

1.4 Caution

Because of the extreme toxicity of many of these compounds, the analyst must take the necessary precautions to prevent exposure to material known or believed to contain CDDs/CDFs.

2.0 SUMMARY OF METHOD

2.1 Extraction

2.1.1 Water samples (samples containing less than one percent solids: The stable isotopically labeled analogs of 15 of the 2,3,7,8-substituted chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs), are spiked into a 1 L sample and the sample is extracted by one of three procedures:

2.1.1.1 Samples containing no visible particles are extracted with methylene chloride in a separatory funnel or by the Solid Phase Extraction (SPE) technique summarized in Section 2.1.1.3. The extract is concentrated for cleanup.

2.1.1.2 Samples containing visible particles are vacuum filtered through a glass fiber filter. The filter is extracted in a Soxhlet/Dean-Stark (SDS) extractor and the filtrate is extracted with methylene chloride in a separatory funnel. The methylene chloride extract is concentrated and combined with the SDS extract prior to cleanup.

2.1.1.3 The sample is vacuum filtered through a glass fiber filter on top of a SPE disk. The filter and disk are extracted in an SDS extractor and the extract is concentrated for cleanup.

2.1.2 Soil/sediment samples: The labeled compounds are spiked into a sample containing 10 g (dry weight) of soil/sediments. Samples containing coarse soil/sediments are ground or homogenized. The soil/sediments are then extracted in an SDS extractor.

2.1.3 Fish and other tissue: The sample is extracted by one of two procedures:

2.1.3.1 A 20 g aliquot of frozen sample is homogenized and a 10 g aliquot is spiked with the labeled compounds. The sample is mixed with sodium sulfate, allowed to dry overnight, and extracted for 12 to 24 hours using methylene chloride:hexane (1:1) in a Soxhlet extractor. The extract is evaporated to dryness and the lipid content is determined.

2.1.3.2 A 20 g aliquot is homogenized and a 10 g aliquot is placed in a bottle and spiked with the labeled compounds. After equilibration, 200 mL of hydrochloric acid and 200 mL of methylene chloride:hexane (1:1) are added and the bottle is agitated for 12 to 24 hours. The extract is evaporated to dryness and the lipid content is determined.

2.2 Cleanup and Analysis

2.2.1 After extraction, the cleanup standard, $^{37}Cl_4$-labeled 2,3,7,8-TCDD, is added to each extract to measure the efficiency of the cleanup process. Sample cleanups may include back extraction with acid and/or base, gel permeation, alumina, silica gel, Florisil, and activated carbon chromatography. High Performance Liquid Chromatography (HPLC) can be used for further isolation of the 2,3,7,8-isomers or other specific isomers or congeners. Prior to the cleanup procedures above, tissue extracts are cleaned up using an anthropogenic isolation column, a batch silica gel adsorption, or sulfuric acid back extraction, depending on the tissue extraction procedure used.

2.2.2 After cleanup, the extract is concentrated to near dryness. Immediately prior to injection, the two internal standards, $^{13}C_{12}$-1,2,3,4-TCDD and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD, are added to each extract. The former is used to determine the Percent Recoveries (%R) of tetra- and pentachlorinated CDD/CDF congeners, while the latter is used to determine the recoveries of the hexachlorinated, heptachlorinated, and octachlorinated CDD/CDF congeners.

2.2.3 An aliquot of the extract is injected into the High Resolution Gas Chromatograph (HRGC). The analytes are separated by the HRGC and detected by a High Resolution (≥ 10,000) Mass Spectrometer (HRMS). Two exact mass-to-charge ratio (m/z) ions are monitored for each analyte.

2.2.4 An individual CDD/CDF is identified by comparing the HRGC Retention Time (RT) and ion abundance ratio of two exact m/z's with the corresponding RT of an authentic standard and the theoretical or acquired ion abundance ratio of the two exact m/z's. The non-2,3,7,8-substituted isomers and congeners are identified when RTs and ion abundance ratios agree within pre-defined limits. Isomer specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF is achieved using HRGC columns that resolve these isomers from the other tetra-isomers.

2.3 Quantitative Analyses

2.3.1 Quantitative analysis is performed using Selected Ion Current Profile (SICP) areas, in one of the following ways.

2.3.1.1 For the fifteen 2,3,7,8-substituted CDDs/CDFs with labeled compound analogs, the HRGC/HRMS system is calibrated and the compound concentration is determined using the isotope dilution technique. The procedure used in determining the concentrations of 1,2,3,7,8,9-HxCDD and octachlorinated dibenzofuran (OCDF) is detailed in Section 11.2.

2.3.1.2 For the labeled compounds and the cleanup standard, the Gas Chromatograph/Mass Spectrometer (GC/MS) system is calibrated and the concentration of each compound is determined using the internal standard technique.

2.3.1.3 For non-2,3,7,8-substituted isomers and for all isomers at a given level of chlorination (e.g., total TCDD), concentrations are determined using Relative Response Factors (RRFs)from calibration of native analogs at the same level of chlorination.

2.3.2 The quality of the analysis is assured through reproducible calibration and testing of the extraction, cleanup, and HRGC/HRMS systems.

3.0 DEFINITIONS

See Exhibit G for a complete list of definitions.

4.0 INTERFERENCES

4.1 Sources

Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or elevated baselines causing misinterpretation of chromatograms. Specific selection of reagents and purification of solvents by distillation in all glass systems may be required. Where possible, reagents are cleaned by extraction or solvent rinse.

4.2 Glassware Cleaning

Proper cleaning of glassware is extremely important because glassware may not only contaminate the samples, but may also remove the analytes of interest by adsorption on the glass surface.

4.2.1 Glassware should be rinsed with solvent and washed with a detergent solution as soon after use as is practical. Sonication of glassware containing a detergent solution may aid in cleaning. Glassware with removable parts, particularly separatory funnels with fluoropolymer stopcocks, must be disassembled prior to detergent washing.

4.2.2 After detergent washing, glassware should be rinsed immediately, first with methanol, then with hot tap water. The tap water rinse is followed by another methanol rinse, then acetone, and then methylene chloride.

4.2.3 Do not bake reusable glassware in an oven as a routine part of cleaning. Baking may be warranted after particularly dirty samples are encountered but should be minimized, as repeated baking of glassware may cause active sites on the glass surface that will irreversibly adsorb CDDs/CDFs.

4.2.4 Immediately prior to use, the Soxhlet apparatus should be pre-extracted with toluene for approximately 3 hours. Separatory funnels should be shaken with methylene chloride/toluene (80/20 mixture) for 2 minutes, drained, and then shaken with pure methylene chloride for 2 minutes.

4.3 Reagents and Materials

All materials used in the analysis shall be demonstrated to be free from interferences by running reference matrix method blanks initially and with each sample batch (samples started through the extraction process on a given 12-hour shift, to a maximum of 20 samples).

4.3.1 The reference matrix must simulate, as closely as possible, the sample matrix under testing. The reference matrix should not contain the CDDs/CDFs in detectable amounts. See Section 12.1 for further guidance. USEPA retains the option to supply the Contractor with a reference matrix with the expected interferences for a particular project.

4.3.2 When a reference matrix that simulates the sample matrix under testing is not available, reagent water (see Section 7.6.1) can be used to simulate water samples; playground sand (see Section 7.6.2) or white quartz sand (see Section 7.3.2) can be used to simulate soils, and corn oil (see Section 7.6.3) can be used to simulate tissues.

4.4 Sample Cleanup

Interferences coextracted from samples will vary considerably from source to source, depending on the diversity of the site being sampled. Interfering compounds may be present at concentrations several orders of magnitude higher than the CDDs/CDFs. The most frequently encountered interferences are chlorinated biphenyls, methoxy biphenyls, hydroxydiphenyl ethers, benzylphenyl ethers, polynuclear aromatics, and pesticides. Because very low levels of CDDs/CDFs are measured by this method, the elimination of interferences is essential. The cleanup steps given must be used to reduce or eliminate

these interferences and thereby permit reliable determination of the CDDs/CDFs at the levels shown in Table 2 and in Exhibit C.

4.5 Equipment

Each piece of reusable glassware should be numbered to associate that glassware with the processing of a particular sample. This will assist the laboratory in tracking possible sources of contamination for individual samples, identifying glassware associated with highly contaminated samples that may require extra cleaning, and determining when glassware should be discarded.

4.6 Lipids

The natural lipid content of tissue can interfere in the analysis of tissue samples for the CDDs/CDFs. The lipid contents of different species and portions of tissue can vary widely. Lipids are soluble to varying degrees in various organic solvents and may be present in sufficient quantity to overwhelm the column chromatographic cleanup procedures used for cleanup of sample extracts. Lipids must be removed by the lipid removal procedures, followed by alumina or Florisil, and carbon as minimum additional cleanup steps. If chlorodiphenyl ethers are detected, as indicated by the presence of peaks at the exact mass-to-charge ratios (m/z's) monitored for these interferents, alumina and/or Florisil cleanup must be employed to eliminate these interferences.

5.0 SAFETY

5.1 Toxicity

The toxicity or carcinogenicity of each compound or reagent used in this method has not been precisely determined; however, each chemical compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level.

5.1.1 The 2,3,7,8-TCDD isomer has been found to be acnegenic, carcinogenic, and teratogenic in laboratory animal studies. It is soluble in water to approximately 200 ppt, and in organic solvents to 0.14%. On the basis of the available toxicological and physical properties of 2,3,7,8-TCDD, all of the chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) should be handled only by highly-trained personnel thoroughly familiar with handling and cautionary procedures and the associated risks.

5.1.2 It is recommended that the laboratory purchase dilute standard solutions of the analytes in this method. However, if primary solutions are prepared, they shall be prepared in a hood, and a Occupational Safety and Health Administration/Mining Safety and Health Administration (OSHA/MSHA) approved toxic gas respirator shall be worn when high concentrations are handled.

5.2 Occupational Safety and Health Administration (OSHA) Requirements

The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of Material Safety Data Sheets (MSDSs) should also be made available to all personnel involved in these analyses. It is also suggested that the laboratory perform personal hygiene monitoring of each analyst who uses this method and that the results of this monitoring be made available to the analyst.

5.3 Sample Handling

The CDDs/CDFs and samples suspected to contain these compounds are handled using essentially the same techniques employed in handling radioactive or infectious materials. Well-ventilated, controlled access laboratories are required. Assistance in evaluating the health hazards of particular laboratory conditions may be obtained from certain consulting laboratories and from State Departments of Health or Labor, many of which have an industrial health service. The CDDs/CDFs are extremely toxic to laboratory animals. The contractor must develop a strict safety program for handling these compounds.

5.3.1 Facility - When finely divided samples (dusts, soils, and dry chemicals) are handled, all operations (including removal of samples from sample containers, weighing, transferring, and mixing) should be performed in a glove box demonstrated to be leak-tight, or in a fume hood demonstrated to have adequate air flow. Gross losses to the laboratory ventilation system must not be allowed. Handling of the dilute solutions normally used in analytical and animal work presents no inhalation hazards except in the case of an accident.

5.3.2 Protective equipment — Disposable plastic gloves, apron or lab coat, safety glasses or mask, and a glove box or fume hood adequate for radioactive work should be used. During analytical operations that may give rise to aerosols or dusts, personnel should wear respirators equipped with activated carbon filters. Eye protection equipment (preferably full face shields) must be worn while working with exposed samples or pure analytical standards. Latex gloves are commonly used to reduce exposure of the hands. When handling samples suspected or known to contain high concentrations of the CDDs/CDFs, an additional set of gloves can also be worn beneath the latex gloves.

5.3.3 Training — Workers must be trained in the proper method of removing contaminated gloves and clothing without contacting the exterior surfaces.

5.3.4 Personal hygiene — Hands and forearms should be washed thoroughly after each manipulation and before breaks (coffee, lunch, and shift).

5.3.5 Confinement — Isolated work areas posted with signs, segregated glassware and tools, and plastic absorbent paper on bench tops will aid in confining contamination.

5.3.6 Effluent vapors — The effluents of sample splitters from the Gas Chromatograph (GC) and from roughing pumps on the Mass Spectrometer (MS) should pass through either a column of activated charcoal or be bubbled through a trap containing oil or high boiling alcohols to condense CDD/CDF vapors.

5.3.7 Waste handling — Good technique includes minimizing contaminated waste. Plastic bag liners should be used in waste cans. Janitors and other personnel must be trained in the safe handling of waste.

5.4 Decontamination

5.4.1 Decontamination of personnel — Use any mild soap with plenty of scrubbing action.

5.4.2 Glassware, tools, and surfaces — Chlorothene NU Solvent is the least toxic solvent shown to be effective. Satisfactory cleaning may be accomplished by rinsing with Chlorothene, then washing with any detergent and water. If glassware is first rinsed with solvent, the dishwater may be disposed of in the sewer. Given the cost of disposal, it is prudent to minimize solvent wastes.

5.4.3 Laundry — Clothing known to be contaminated should be collected in plastic bags. Persons who convey the bags and launder the clothing should be advised of the hazard and trained in proper handling. The clothing may be put into a washer without contact if the launderer knows of the potential problem. The washer should be run through an empty cycle before being used again for other clothing.

5.4.4 Wipe tests — A useful method of determining cleanliness of work surfaces and tools is to wipe the surface with a piece of filter paper. Extraction and analysis by GC with an Electron Capture Detector (ECD) can achieve a limit of detection of 0.1 µg per wipe; analysis using this method can achieve an even lower detection limit. Less than 0.1 µg per wipe indicates acceptable cleanliness; anything higher warrants further cleaning. More than 10 µg on a wipe constitutes an acute hazard and requires prompt cleaning before further use of the equipment or work space, and indicates that unacceptable work practices have been employed.

5.4.5 Table or wrist-action shaker — The use of a table or wrist-action shaker for extraction of tissues presents the possibility of breakage of the extraction bottle and spillage of acid and flammable organic solvent. A secondary containment system around the shaker is suggested to prevent the spread of acid and solvents in the event of such a breakage. The speed and intensity of shaking action should also be

adjusted to minimize the possibility of breakage.

6.0 EQUIPMENT AND SUPPLIES

6.1 Glassware Cleaning — Laboratory sink with overhead fume hood.

6.2 Equipment for Sample Preparation

6.2.1 Laboratory fume hood of sufficient size to contain the sample preparation equipment listed below.

6.2.2 Glove box (optional).

6.2.3 Tissue homogenizer — VirTis Model 45 Macro homogenizer (American Scientific Products H-3515, or equivalent) with stainless steel Macro-shaft and Turbo-shear blade.

6.2.4 Meat grinder — Hobart, or equivalent, with 3-5 mm holes in inner plate.

6.2.5 Equipment for determining Percent Solids (%S)

6.2.5.1 Oven — Capable of maintaining a temperature of 110°C (±5°C).

6.2.5.2 Desiccator.

6.2.6 Balances

6.2.6.1 Analytical — Capable of weighing ±0.1 mg.

6.2.6.2 Top loading — Capable of weighing ±10 mg.

6.3 Extraction Apparatus

6.3.1 Water samples

6.3.1.1 pH meter, with combination glass electrode.

6.3.1.2 pH paper, wide range (Hydrion Papers, or equivalent).

6.3.1.3 Graduated cylinder, 1 L capacity.

6.3.1.4 Liquid/liquid extraction — Separatory funnels, 250 mL, 500 mL, and 2000 mL, with fluoropolymer stopcocks.

6.3.1.5 Solid-Phase Extraction (SPE)

6.3.1.5.1 1 L filtration apparatus, including glass funnel, glass frit support, clamp, adapter, stopper, filtration flask, and vacuum tubing. For wastewater samples, the apparatus should accept 90 or 144 mm disks. For drinking water or other samples containing low solids, smaller disks may be used.

6.3.1.5.2 Vacuum source capable of maintaining 25 inches Hg, equipped with shutoff valve and vacuum gauge.

6.3.1.5.3 Glass fiber filter — Whatman GMF 150 (or equivalent), 1 micron pore size, to fit filtration apparatus described in Section 6.3.1.5.1.

6.3.1.5.4 SPE disk containing octadecyl (C_{18}) bonded silica uniformly enmeshed in an inert matrix, Fisher Scientific 14-378F (or equivalent), to fit filtration apparatus described in Section 6.3.1.5.1.

6.3.2 Soxhlet/Dean-Stark (SDS) extractor — For filters and solid/sludge samples.

6.3.2.1 Soxhlet — 50 mm ID, 200 mL capacity with 500 mL flask (Cal-Glass LG-6900, or equivalent, except substitute 500 mL round-bottom flask for 300 mL flat-bottom flask).

6.3.2.2 Thimble — 43 x 123 to fit Soxhlet (Cal-Glass LG-6901-122, or equivalent).

6.3.2.3 Moisture trap — Dean-Stark or Barret with fluoropolymer stopcock, to fit Soxhlet.

6.3.2.4 Heating mantle — Hemispherical, to fit 500 mL round-bottom flask (Cal-Glass LG-8801-112, or equivalent).

6.3.2.5 Variable transformer — Powerstat (or equivalent), 110 volt, 10 amp.

6.3.3 Apparatus for Extraction of Tissue

6.3.3.1 Bottle for extraction (if digestion/extraction using HCl is used) — 500-600 mL wide-mouth clear glass, with fluoropolymer lined cap.

6.3.3.2 Bottle for back extraction — 100-200 mL narrow mouth clear glass with fluoropolymer lined cap.

6.3.3.3 Mechanical shaker — Wrist-action or platform-type rotary shaker that produces vigorous agitation (Sybron Thermolyne Model LE "Big Bill" rotator/shaker, or equivalent).

6.3.3.4 Rack attached to shaker table to permit agitation of 4 to 9 samples simultaneously.

6.3.4 Beakers — 400-500 mL.

6.3.5 Spatulas — Stainless steel or glass rod.

6.4 Filtration Apparatus

6.4.1 Pyrex glass wool — Solvent extracted by SDS for 3 hours minimum. DO NOT BAKE.

6.4.2 Glass funnel — 125-250 mL.

6.4.3 Glass fiber filter paper — Whatman GF/D (or equivalent), to fit glass funnel referenced in Section 6.4.2.

6.4.4 Drying column — 15-20 mm ID Pyrex chromatographic column equipped with coarse-glass frit or glass-wool plug.

6.4.5 Buchner funnel — 15 cm.

6.4.6 Glass fiber filter paper to fit Buchner funnel referenced in Section 6.4.5.

6.4.7 Filtration flasks — 1.5-2 L, with side arm.

6.4.8 Pressure filtration apparatus, Millipore YT30 142 HW, or equivalent.

6.5 Centrifuge Apparatus

6.5.1 Centrifuge — Capable of rotating 500 mL centrifuge bottles or 15 mL centrifuge tubes at 5,000 rpm minimum.

6.5.2 Centrifuge bottles — 500 mL, with screw-caps, to fit centrifuge.

6.5.3 Centrifuge tubes — 12-15 mL, with screw-caps, to fit centrifuge.

6.6 Cleanup Apparatus

6.6.1 Automated Gel Permeation Chromatograph (GPC) (Analytical Biochemical Labs, Inc., Columbia, MO, Model GPC Autoprep 1002, or equivalent).

6.6.1.1 Column — 600-700 mm long x 25 mm ID, packed with 70 g of SX-3 Bio-beads (Bio-Rad Laboratories, Richmond, CA, or equivalent).

6.6.1.2 Syringe — 10 mL, with Luer fitting.

6.6.1.3 Syringe filter holder — Stainless steel, and glass fiber or fluoropolymer filters (Gelman 4310, or equivalent).

6.6.1.4 UV detectors — 254 nm, preparative or semi-preparative flow cell (Isco, Inc., Type 6; Shimadzu, 5 mm path length; Beckman-Altex 152W, 8 µL micro-prep flow cell, 2 mm path; Pharmacia UV-1, 3 mm flow cell; LDC Milton-Roy UV-3, monitor #1203; or equivalent).

6.6.2 Reverse-phase High Performance Liquid Chromatograph (HPLC)

6.6.2.1 Column oven and detector — Perkin-Elmer Model LC-65T (or equivalent) operated at 0.02 AUFS at 235 nm.

6.6.2.2 Injector — Rheodyne 7120 (or equivalent) with 50 µL sample loop.

6.6.2.3 Column — Two 6.2 mm x 250 mm Zorbax-ODS columns in series (DuPont Instruments Division, Wilmington, DE, or equivalent), operated at 50°C with 2.0 mL/min methanol isocratic effluent.

6.6.2.4 Pump — Altex 110A (or equivalent).

6.6.3 Pipets

6.6.3.1 Disposable, pasteur — 150 mm long x 5 mm ID (Fisher Scientific 13-678-6A, or equivalent).

6.6.3.2 Disposable, serological — 10 mL (6 mm ID).

6.6.4 Glass chromatographic columns

6.6.4.1 150 mm long x 8 mm ID, (Kontes K-420155, or equivalent) with coarse-glass frit or glass wool plug and 250 mL reservoir.

6.6.4.2 200 mm long x 15 mm ID, with coarse-glass frit or glass wool plug and 250 mL reservoir.

6.6.4.3 300 mm long x 25 mm ID, with 300 mL reservoir and glass or fluoropolymer stopcock.

6.6.5 Stirring apparatus for batch silica cleanup of tissue extracts.

6.6.5.1 Mechanical stirrer — Corning Model 320, or equivalent.

6.6.5.2 Bottle — 500-600 mL wide mouth clear glass.

6.6.6 Oven — for baking and storage of adsorbents, capable of maintaining a constant temperature (±5°C) in the range of 105-250°C.

6.7 Concentration Apparatus

6.7.1 Rotary evaporator — Buchi/Brinkman-American Scientific No. E5045-10 or equivalent, equipped with a variable temperature water bath.

6.7.1.1 Vacuum source for rotary evaporator equipped with shutoff valve at the evaporator and vacuum gauge.

6.7.1.2 A recirculating water pump and chiller are recommended, as use of tap water for cooling the evaporator wastes large volumes of water and can lead to inconsistent performance as water temperatures and pressures vary.

6.7.1.3 Round bottom flask — 100 mL and 500 mL or larger, with ground-glass fitting compatible with the rotary evaporator.

6.7.2 Kuderna-Danish (K-D) Concentrator

6.7.2.1 Concentrator tube — 10 mL, graduated (Kontes K-570050-1025, or equivalent) with calibration verified. Ground-glass stopper (size 19/22 joint) is used to prevent

evaporation of extracts.

6.7.2.2 Evaporation flask — 500 mL (Kontes K-570001-0500, or equivalent), attached to concentrator tube with springs (Kontes K-662750-0012 or equivalent).

6.7.2.3 Snyder column — Three ball macro (Kontes K-503000-0232, or equivalent).

6.7.2.4 Boiling chips

6.7.2.4.1 Glass or silicon carbide — Approximately 10/40 mesh, extracted with methylene chloride.

6.7.2.4.2 Fluoropolymer (optional) — Extracted with methylene chloride.

6.7.2.5 Water bath — Heated, with concentric ring cover, capable of maintaining a temperature within ±2°C, installed in a fume hood.

6.7.3 Nitrogen blowdown apparatus — Equipped with water bath controlled in the range of 30-60°C (N-Evap, Organomation Associates, Inc., South Berlin, MA, or equivalent), installed in a fume hood.

6.7.4 Sample vials

6.7.4.1 Amber glass — 2-5 mL with fluoropolymer lined screw cap.

6.7.4.2 Glass — 0.3 mL, conical, with fluoropolymer lined screw or crimp cap.

6.8 Gas Chromatograph (GC)

Shall have splitless or on-column injection port for capillary column, temperature program with isothermal hold, and shall meet all of the performance specifications listed in Section 9 of this exhibit.

6.8.1 GC column for CDDs/CDFs and for isomer specificity for 2,3,7,8-TCDD—60 ±5 m long x 0.32 ±0.02 mm ID; 0.25 µm 5% phenyl, 94% methyl, 1% vinyl silicone bonded-phase fused-silica capillary column (J&W DB-5, or equivalent).

6.8.2 GC column for isomer specificity for 2,3,7,8-TCDF—30 ±5 m long x 0.32 ±0.02 mm ID; 0.25 µm bonded-phase fused-silica capillary column (J&W DB-225, or equivalent).

6.9 Mass Spectrometer (MS)

28-40 eV electron impact ionization that shall be capable of repetitively selectively monitoring 12 exact mass-to-charge ratios (m/z's) minimum at high resolution (≥10,000) during a period of approximately one second, and shall meet all of the performance specifications listed in Section 9 of this exhibit.

6.10 Gas Chromatograph/Mass Spectrometer (GC/MS) Interface

The MS shall be interfaced to the GC such that the end of the capillary column terminates within 1 cm of the ion source, but does not intercept the electron or ion beams.

6.11 Data System

Capable of collecting, recording, and storing MS data.

7.0 REAGENTS AND STANDARDS

7.1 pH Adjustment and Back Extraction

7.1.1 Potassium hydroxide — Dissolve 20 g reagent grade KOH in 100 mL reagent water.

7.1.2 Sulfuric acid — Reagent grade (specific gravity 1.84).

7.1.3 Hydrochloric acid, 6N. (1:1) Add 500 mL concentrated HCl to 400 mL reagent water and

dilute to 1 L.

7.1.4 Sodium chloride — solution. Dissolve 50g of reagent grade NaCl to reagent water and dilute to 1 L.

7.2 Solution Drying and Evaporation

7.2.1 Solution drying — Sodium sulfate, reagent grade, granular, anhydrous (Baker 3375, or equivalent), rinsed with methylene chloride (20 mL/g), baked at 400°C for one hour minimum, cooled in a desiccator, and stored in a pre-cleaned glass bottle with screw-cap that prevents moisture from entering. If, after heating, the sodium sulfate develops a noticeable grayish cast (due to the presence of carbon in the crystal matrix), that batch of reagent is not suitable for use and should be discarded. Extraction with methylene chloride (as opposed to simple rinsing) and baking at a lower temperature may produce sodium sulfate that is suitable for use.

7.2.2 Tissue drying — Sodium sulfate, reagent grade, powdered, treated and stored as described above.

7.2.3 Pre-purified Nitrogen.

7.3 Extraction

7.3.1 Solvents — Acetone, toluene, cyclohexane, hexane, methanol, methylene chloride, and nonane; distilled in glass, pesticide quality, lot-certified to be free of interferences.

7.3.2 White quartz sand, 60/70 mesh — For Soxhlet/Dean-Stark (SDS) extraction (Aldrich Chemical, Cat. No. 27-437-9, or equivalent). Bake at 450°C for 4 hours minimum.

7.4 Gel Permeation Chromatography (GPC) Calibration Solution

Prepare a solution in methylene chloride containing 300 mg/mL corn oil, 15 mg/mL bis(2-ethylhexyl) phthalate, 1.4 mg/mL pentachlorophenol, 0.1 mg/mL perylene, and 0.5 mg/mL sulfur.

7.5 Adsorbents for Sample Cleanup

7.5.1 Silica Gel

7.5.1.1 Activated silica gel — 100-200 mesh, Supelco 1-3651 (or equivalent), rinsed with methylene chloride, baked at 180°C for a minimum of one hour, cooled in a desiccator, and stored in a pre-cleaned glass bottle with screw-cap that prevents moisture from entering.

7.5.1.2 Acid silica gel (30% w/w) — Thoroughly mix 44.0 g of concentrated sulfuric acid with 100.0 g of activated silica gel in a clean container. Break up aggregates with a stirring rod until a uniform mixture is obtained. Store in a bottle with a fluoropolymer lined screw-cap.

7.5.1.3 Basic silica gel — Thoroughly mix 30 g of 1N sodium hydroxide with 100 g of activated silica gel in a clean container. Break up aggregates with a stirring rod until a uniform mixture is obtained. Store in a bottle with a fluoropolymer lined screw-cap.

7.5.1.4 Potassium Silicate

7.5.1.4.1 Dissolve 56 g of high purity potassium hydroxide (Aldrich, or equivalent) in 300 mL of methanol in a 750-1000 mL flat-bottom flask.

7.5.1.4.2 Add 100 g of silica gel and a stirring bar, and stir on a hot plate at 60-70°C for 1 to 2 hours.

7.5.1.4.3 Decant the liquid and rinse the potassium silicate twice with 100 mL portions of methanol, followed by a single rinse with 100 mL of methylene chloride.

7.5.1.4.4 Spread the potassium silicate on solvent-rinsed aluminum foil and dry for 2 to 4 hours in a hood.

7.5.1.4.5 Activate overnight at 200-250°C.

7.5.2 Alumina — Either one of two types of alumina, acid or basic, may be used in the cleanup of sample extracts. The same type of alumina must be used for all samples.

7.5.2.1 Acid alumina — Supelco 19996-6C (or equivalent). Activate by heating to 130°C for a minimum of 12 hours.

7.5.2.2 Basic alumina — Supelco 19944-6C (or equivalent). Activate by heating to 600°C for a minimum of 24 hours. Alternatively, activate by heating in a tube furnace at 650-700°C under an air flow rate of approximately 400 cc/minute. Do not heat over 700°C, as this can lead to reduced capacity for retaining the analytes. Store at 130°C in a covered flask. Use within five days of baking.

7.5.3 Carbon

7.5.3.1 Carbopak C — Supelco 1-0258, or equivalent.

7.5.3.2 Celite 545 — Supelco 2-0199, or equivalent.

7.5.3.3 Thoroughly mix 9.0 g Carbopak C and 41.0 g Celite 545. Activate the mixture at 130°C for a minimum of 6 hours. Store in a desiccator.

7.5.4 Anthropogenic isolation column — Pack the column in Section 6.6.4.3 from bottom to top with the following:

- 2 g silica gel (see Section 7.5.1.1);
- 2 g potassium silicate (see Section 7.5.1.4);
- 2 g granular anhydrous sodium sulfate (see Section 7.2.1);
- 10 g acid silica gel (see Section 7.5.1.2); and
- 2 g granular anhydrous sodium sulfate.

7.5.5 Florisil Column

7.5.5.1 Florisil—60 - 100 mesh, Floridin Corp (or equivalent). Soxhlet extract in 500 g portions for 24 hours.

7.5.5.2 Insert a glass wool plug into the tapered end of a graduated serological pipet (see Section 6.6.3.2). Pack with 1.5 g (approximately 2 mL) of Florisil topped with approximately 1 mL of sodium sulfate (see Section 7.2.1) and a glass wool plug.

7.5.5.3 Activate in an oven at 130-150°C for a minimum of 24 hours and cool for 30 minutes. Use within 90 minutes of cooling.

7.6 Reference Matrices

Matrices in which the chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) and interfering compounds are not detected by this method.

7.6.1 Reagent water — Water demonstrated to be free from the analytes of interest and potentially interfering substances.

7.6.2 High-solids reference matrix — Playground sand or similar material. Prepared by extraction with methylene chloride and/or baking at 450°C for a minimum of 4 hours.

7.6.3 Tissue reference matrix — Corn or other vegetable oil. May be prepared by extraction with methylene chloride.

7.6.4 Other matrices — This method may be verified on any reference matrix that is free of the CDDs/CDFs, and in no case shall the background level of the CDDs/CDFs exceed the Contract Required Quantitation Limits (CRQLs) in Exhibit C.

7.7 Solutions

7.7.1 Standard Solutions - Purchased as solutions or mixtures with certification to their purity, concentration, and authenticity, or prepared from materials of known purity and composition. If the chemical purity is 98% or greater, the weight may be used without correction to compute the concentration of the standard. When not being used, standards are stored in the dark at room temperature in screw-capped vials with fluoropolymer lined caps. A mark is placed on the vial at the level of the solution so that solvent loss by evaporation can be detected. If solvent loss has occurred, the solution should be replaced.

7.7.2 Stock Solutions

7.7.2.1 Preparation — Prepare in nonane per the steps below or purchase as dilute solutions (Cambridge Isotope Laboratories (CIL), Woburn, MA, or equivalent). Observe the safety precautions outlined in Section 5 of this exhibit, paying close attention to the recommendation in Section 5.1.2.

7.7.2.2 Dissolve an appropriate amount of assayed reference material in solvent. For example, weigh 1-2 mg of 2,3,7,8-TCDD in a 10 mL ground glass-stoppered volumetric flask and fill to the mark with nonane. After the TCDD is completely dissolved, transfer the solution to a clean 15 mL vial with a fluoropolymer lined cap.

7.7.2.3 Stock standard solutions should be checked for signs of degradation prior to the preparation of calibration standards.

7.7.3 Native compound stock solution - All CDDs/CDFs — Using the solutions described in Section 7.7.2, prepare the native compound stock solution to contain the CDDs/CDFs at the concentrations shown in Table 3.

7.7.4 Labeled Compound Spiking Solution

7.7.4.1 Prepare this solution from CDDs/CDFs stock solutions, or from purchased mixtures. Prepare this solution to contain the labeled compounds in nonane at the concentrations shown in Table 3. This solution is diluted with acetone prior to use (see Section 7.7.4.2).

7.7.4.2 Dilute a sufficient volume of the labeled compound solution (see Section 7.7.4.1) by a factor of 50 with acetone to prepare a diluted spiking solution. Each sample requires 1 mL of the diluted solution, but no more solution shall be prepared than can be used in one day. The Contractor shall provide a standard preparation log documenting the daily preparation of the labeled compound solution. Seal with Teflon tape and mark the meniscus of the solution to reduce and monitor evaporation of acetone.

7.8 Standards

7.8.1 Cleanup standard - Prepare $^{37}Cl_4$-2,3,7,8-TCDD in nonane at the concentration shown in Table 3. The cleanup standard is added to all extracts prior to cleanup to measure the efficiency of the cleanup process.

7.8.2 Internal standard(s) - Prepare the internal standard solution to contain $^{13}C_{12}$-1,2,3,4-TCDD and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD in nonane at the concentration shown in Table 3. The internal standard solution is added to all extracts prior to analysis.

7.8.3 Calibration standards (CS1 through CS5) — Combine the solutions described in Sections 7.7.3 through 7.8.2 to produce the five calibration solutions shown in Table 4 in nonane. These solutions permit the Relative Response (RR) (labeled to native) and Relative Response Factor (RRF) to be measured as a function of concentration. The Mid-Point Calibration Standard (CS3) is used for calibration verification.

7.8.4 Laboratory Control Sample (LCS) spiking solution — used for the LCS. Dilute 10 µL of

the native compound stock solution (see Section 7.7.3) to 2 mL with acetone for each sample matrix for each sample batch. One mL is required for the LCS with each matrix in each batch.

7.8.5 Gas Chromatograph (GC) Retention Time (RT) Window Defining Mixture (WDM) and isomer specificity check standard — Used to define the beginning and ending RTs for the dioxin and furan isomers and to demonstrate isomer specificity of the GC columns employed for determination of 2,3,7,8-TCDD and 2,3,7,8-TCDF. The standard must contain the compounds listed in Table 5 (CIL EDF-4006, or equivalent), at a minimum.

7.9 Stability of Solutions

Standard solutions used for quantitative purposes (see Sections 7.7.4 through 7.8.5) should be analyzed periodically, and should be assayed against reference standards (see Section 7.7.2.2) before further use.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

8.1 Sample Collection and Preservation

8.1.1 Grab and composite samples must be collected in amber glass containers following conventional sampling practices.

8.1.2 Fish and tissue samples collected in the field must be wrapped in aluminum foil, and must be maintained at a temperature of less than 4°C from the time of collection until receipt at the laboratory.

8.2 Procedure for Sample Storage

8.2.1 Maintain water and soil samples at 4°C (± 2°C) in the dark from the time of collection until extraction. If residual chlorine is present in aqueous samples, add 80 mg sodium thiosulfate per liter of water. EPA Methods 330.4 and 330.5 may be used to measure residual chlorine. If sample pH is greater than 9, adjust to pH 7-9 with sulfuric acid.

8.2.2 Fish and tissue samples received at the laboratory must be maintained at less than -10°C until prepared. Unused samples must be maintained at less than -10°C. Once thawed, tissue samples must be extracted within 24 hours.

8.2.3 Samples must be stored in an atmosphere demonstrated to be free of all potential contaminants.

8.2.4 Samples, sample extracts, and standards must be stored separately.

8.3 Contract Required Holding Times

8.3.1 All samples (except fish and tissue) shall be extracted within 10 days of the Validated Time of Sample Receipt (VTSR).

8.3.2 Analysis of sample extracts must be completed within 30 days of extraction.

9.0 CALIBRATION AND STANDARDIZATION

9.1 High Resolution Gas Chromatographic/High Resolution Mass Spectrometric (HRGC/HRMS) Conditions and Data Acquisition Parameters

9.1.1 High Resolution Gas Chromatograph (HRGC)

9.1.1.1 Prior to analyzing the calibration solutions, blanks, samples, and Quality Control (QC) samples, establish the HRGC operating conditions necessary to meet the minimum Retention Times (RTs) for the internal standards and the Relative Retention Times (RRTs) for the chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs). Once optimized, the same conditions must be used for the analysis of all standards, samples, blanks, and QC samples.

9.1.1.1.1 Suggested GC operating conditions:

Injector temperature:	270°C
Interface temperature:	290°C
Initial temperature:	200°C
Initial time:	2 minutes
Temperature program:	200 to 220°C, at 5°C/min 220°C for 16 minutes 220 to 235°C, at 5°C/min 235°C for 7 minutes 235 to 330°C, at 5°C/min

9.1.1.1.2 All portions of the column that connect the HRGC to the ion source shall remain at or above the interface temperature specified above during analysis to preclude condensation of less-volatile compounds.

9.1.2 High Resolution Mass Spectrometer (HRMS)

9.1.2.1 Prior to analyzing the calibration solutions, blanks, samples, and QC samples, obtain an HRMS Selected Ion Current Profile (SICP), of each analyte at the specified two exact mass-to-charge ratios (m/z's) and at ≥ 10,000 resolving power by injecting an authentic standard of the CDDs/CDFs, either singly or as part of a mixture in which there is no interference between closely eluted components. The total cycle time for each Selected Ion Monitoring (SIM) descriptor must be ≤ 1 second, including the sum of all the ion dwell times and voltage reset time.

9.1.2.2 The analysis time for CDDs/CDFs may exceed the long-term mass stability of the Mass Spectrometer (MS). Because the instrument is operated in the high resolution mode, mass drifts of a few ppm (e.g., 5 ppm in mass) can have serious adverse effects on instrument performance. Therefore, a mass-drift correction is mandatory and a lock-mass m/z from perfluorokerosene (PFK) is used for drift correction. The lock-mass m/z is dependent on the exact m/z's monitored within each descriptor. The level of PFK metered into the HRMS during analyses should be adjusted so that the amplitude of the most intense selected lock-mass m/z signal (regardless of the descriptor number) does not exceed 10% of the full-scale deflection for a given set of detector parameters. Under those conditions, sensitivity changes that might occur during the analysis can be more effectively monitored.

9.1.2.3 If the HRMS has the capability to monitor resolution during the analysis, it is acceptable to terminate the analysis when the resolution falls below 10,000 to save re-analysis time. The GC run should be complete to allow elution of octachlorinated dibenzo-p-dioxin (OCDD) and octachlorinated dibenzofuran (OCDF).

9.2 High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS) System Performance Check

9.2.1 Summary of HRGC/HRMS System Performance Check

9.2.1.1 The HRGC/HRMS system performance check consists of three parts: a) the HRMS system must be tuned to meet the minimum static resolving power, using a suitable calibrant such as PFK; the resolution of the HRGC system must be verified by the analyses of b) the descriptor switching times set using the Window Defining Mixture (WDM), and c) the resolution verified by the analysis of the Isomer Specificity Check.

NOTE: The WDM and Isomer Specificity Check solutions may be combined into a single solution (Column Performance Solution [CPS]), provided that the combined solution contains the isomers needed to determine that the criteria for analysis are met (see Table 5).

9.2.1.2 At the beginning of each 12-hour shift and prior to analysis of any samples, blanks, QC samples, and calibration standards, the Contractor must establish that the HRGC/HRMS system meets the static resolving power for PFK, that the beginning and ending RTs for the dioxin and furan isomers are defined, and that the isomer specificity is demonstrated.

9.2.1.3 The WDM and the isomer specificity check are also used to set the descriptor

switching times such that isomers that elute from the HRGC during a given RT window will also be those isomers for which the ions are monitored.

9.2.1.4 The HRMS System Tune, the WDM, and the Isomer Specificity Check must also be analyzed at the end of each 12-hour shift or analytical sequence. These analyses may also be used to establish the beginning of the next 12-hour shift or analytical sequence.

9.2.2 HRMS System Tune

9.2.2.1 Frequency of HRMS System Tune

9.2.2.1.1 The PFK tune must be performed prior to each 12-hour period during which calibration standards, samples, blanks, and QC samples are to be analyzed.

9.2.2.1.2 The 12-hour time period for the HRGC/HRMS system performance check does not begin until the HRMS system is tuned to meet the minimum required resolving power of 10,000 (10 Percent Valley) at m/z 304.9824 PFK or any other reference signal close to m/z 304 (from TCDF).

9.2.2.2 Procedure of HRMS System Tune

Using a PFK molecular leak, tune the instrument to meet the minimum requirement in Section 9.2.2.1.2. For each descriptor (see Table 8), monitor and record the resolution and exact m/z's of three to five reference peaks covering the mass range of the descriptor.

NOTE: Excessive PFK (or any other reference substance) may cause noise problems and contamination of the ion source resulting in an increase in time necessary to clean the source.

9.2.2.3 Technical Acceptance Criteria for HRMS System Tune

The HRMS static resolving power must be greater than or equal to 10,000, and the deviation between the exact m/z and the theoretical m/z for each exact m/z monitored must be less than 5 ppm.

9.2.2.4 Corrective Action for HRMS System Tune

9.2.2.4.1 Technical acceptance criteria must be met before any standards, samples, QC samples, and required blanks are analyzed. Any analysis conducted when the technical acceptance criteria have not been met will require re-analysis at no additional cost to USEPA.

9.2.2.4.2 If the technical acceptance criteria at the end of the 12-hour shift or analytical sequence are not met, all sample analyzed in that shift or analytical sequence having positive hits will be reanalyzed at no additional cost to USEPA.

9.2.2.4.3 If the technical acceptance criteria are not met, the instrument must be adjusted until the technical acceptance criteria are met.

9.2.3 Window Defining Mixture (WDM)

9.2.3.1 Frequency of WDM

9.2.3.1.1 The WDM must be analyzed as follows:

- After the HRMS PFK tune and before any initial calibration on each instrument and HRGC column used for analysis;

- Once at the beginning of each 12-hour period during which standards or samples are analyzed; and

- Whenever adjustments or instrument maintenance activities are performed that may affect RTs.

9.2.3.1.2 The 12-hour time period for the HRGC/HRMS system performance check and standards calibration (initial or continuing calibration criteria) begins at the moment of injection of the WDM that the laboratory submits as documentation of a compliant instrument performance check. The time period ends after 12 hours have elapsed according to the system clock.

9.2.3.2 Procedure for WDM

9.2.3.2.1 Analyze a 1 or 2 µL aliquot of the WDM.

9.2.3.2.2 Adjust the descriptor switching times and the HRGC column conditions as needed to ensure that the isomers elute in the appropriate ion descriptors. Table 5 gives the elution order (first/last) of the window defining compounds.

9.2.3.3 Technical Acceptance Criteria for WDM

The analysis of the WDM is acceptable if the criteria given in Table 5 are met.

9.2.3.4 Corrective Action for WDM

9.2.3.4.1 Technical acceptance criteria must be met before any standards, samples, QC samples, and required blanks are analyzed. Any analysis conducted when the technical acceptance criteria have not been met will require re-analysis at no additional cost to USEPA.

9.2.3.4.2 If the technical acceptance criteria at the end of the 12-hour shift or analytical sequence are not met, all sample analyzed in that shift or analytical sequence having positive hits will be reanalyzed at no additional cost to USEPA.

9.2.3.4.3 If the technical acceptance criteria are not met, the instrument must be adjusted and the test repeated or the HRGC column must be replaced.

9.2.4 Isomer Specificity Check

9.2.4.1 Frequency of Isomer Specificity Check

9.2.4.1.1 The Isomer Specificity Check must be analyzed as follows:

- After, or simultaneously with the WDM and before any initial calibration on each instrument and HRGC column used for analysis;

- Once at the beginning of each 12-hour period during which standards or samples are analyzed, and

- Whenever adjustments or instrument maintenance activities are performed that may affect retention times.

9.2.4.2 Procedure for Isomer Specificity Check

9.2.4.2.1 Analyze a 1 or 2 µL aliquot of the isomer specificity check solution.

9.2.4.2.2 Compute the Percent Valley between the HRGC peaks that elute most closely to the 2,3,7,8-TCDD and TCDF isomers.

9.2.4.3 Calculations for Isomer Specificity Check

Calculate the valley using the measurements made on the SICP for the appropriate

ion for each isomer using the following equation:

EQ. 1

$$\textbf{Valley} = \left(\frac{X}{Y}\right) \times 100$$

Where:

Y = The peak height of 2,3,7,8 TCDD or TCDF isomer, and

X = The height from the valley of least resolved adjacent isomer to baseline.

9.2.4.4 Technical Acceptance Criteria for Isomer Specificity Check

The isomer specificity check is acceptable if the height of the valley between the least resolved adjacent isomer and the 2,3,7,8-substituted isomers is less than or equal to 25%.

9.2.4.5 Corrective Action for Isomer Specificity Check

9.2.4.5.1 Technical acceptance criteria must be met before any standards, samples, QC samples, and required blanks are analyzed. Any analysis conducted when the technical acceptance criteria have not been met will require re-analysis at no additional cost to USEPA.

9.2.3.5.2 If the technical acceptance criteria at the end of the 12-hour shift or analytical sequence are not met, all sample analyzed in that shift or analytical sequence having positive hits will be reanalyzed at no additional cost to USEPA.

9.2.4.5.3 If the technical acceptance criteria are not met, the instrument must be adjusted and the test repeated or the HRGC column must be replaced.

9.3 Initial Calibration

9.3.1 Summary of Initial Calibration

9.3.1.1 Prior to the analysis of samples and required blanks, and after the HRGC/HRMS system performance check criteria have been met, each HRGC/HRMS system must be calibrated at a minimum of five concentrations to determine instrument sensitivity and the linearity of the HRGC/HRMS response for the target analytes.

9.3.1.2 Calibration by the isotope dilution - Isotope dilution calibration is used for the fifteen 2,3,7,8-substituted CDDs/CDFs for which labeled compounds are added to samples prior to extraction.

9.3.1.2.1 A calibration curve encompassing the concentration range is prepared for each compound to be determined.

9.3.1.2.2 The response of each CDD/CDF relative to its labeled analog is determined using the area responses of both the primary and secondary exact m/z's specified in Table 8, for each calibration.

9.3.1.3 Calibration by Internal Standard - The internal standard method is applied to the determination of the non 2,3,7,8-substituted CDD/CDF, the labeled compounds, and the cleanup standard.

9.3.1.3.1 The Relative Response Factor (RRF) is determined for each labeled compound, non 2,3,7,8-substituted CDD/CDF and the cleanup standard using Equation 3 in Section 9.3.4.2.

9.3.1.4 Combined Calibration - By using calibration solutions containing the native CDDs/CDFs, the labeled compounds, and the internal standards, the single set of

analyses can be used to produce calibration curves for the isotope dilution and internal standard methods.

9.3.2 Frequency of Initial Calibration

9.3.2.1 Each HRGC/HRMS system must be calibrated upon award of the contract, whenever the Contractor takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repairs, column replacement, etc.), or if the calibration verification technical acceptance criteria are not met.

9.3.2.2 If time still remains in the 12-hour time period after meeting the technical acceptance criteria for the initial calibration, samples may be analyzed. It is not necessary to analyze a calibration verification standard within this 12-hour time period if the initial calibration standard that is the same concentration as the calibration verification standard meets the calibration verification technical acceptance criteria. Quantitate all sample and QC sample results against the mean Relative Response (RR) and the mean Relative Response Factor (RRF) from the initial calibration.

9.3.3 Procedure for Initial Calibration

9.3.3.1 Inject a volume of calibration standards CS1 through CS5 identical to the volume and conditions chosen for the HRGC/HRMS system performance check.

9.3.3.2 Acquire SIM mass spectral data for each analyte. The total cycle time must be ≤ 1 second.

9.3.3.3 Compute the RR and RRF for each native and labeled analyte respectively at each concentration level.

9.3.3.4 Determine retention times, signal-to-noise (S/N) ratios, isotopic ratios, and isomer specificity for all calibration standards.

9.3.3.5 Determine linearity of the calibration standards, CS1-CS5, by calculating the Percent Relative Standard Deviation (%RSD) over the five-point calibration range.

9.3.4 Calculations for Initial Calibration

9.3.4.1 The response of each native CDD/CDF relative to its labeled analog is determined using the area responses of both the primary and secondary exact m/z's (specified in Table 8), for each calibration standard, as follows:

EQ. 2

Where:

$$RR = \frac{(A1_N + A2_N)\ C_L}{(A1_L + A2_L)\ C_N}$$

RR = Relative Response of native compound to its labeled analog.

$A1_N$ and $A2_N$ = The areas of the primary and secondary m/z's for the native compound.

$A1_L$ and $A2_L$ = The areas of the primary and secondary m/z's for the labeled compound.

C_L = The concentration of the labeled compound in the calibration standard.

C_N = The concentration of the native compound in the calibration standard.

9.3.4.2 The RRF is determined for each labeled compound by the following equation:

EQ. 3

$$RRF = \frac{(A1_S + A2_S)\ C_{IS}}{(A1_{IS} + A2_{IS})\ C_S}$$

Where:

RRF = Relative Response Factor of each labeled analog to its internal standard.

$A1_S$ and $A2_S$ = The areas of the primary and secondary m/z's for the labeled compound.

$A1_{IS}$ and $A2_{IS}$ = The areas of the primary and secondary m/z's for the internal standard.

C_{IS} = The concentration of the internal standard.

C_S = The concentration of the compound in the calibration standard.

9.3.4.3 The mean Relative Response is determined by the following equation:

EQ. 4

$$\overline{RR} = \frac{\sum_{j=1}^{5} RR}{5}$$

Where:

$\overline{RR}$ = The mean Relative Response of the five initial calibration standards.

j = The injection number (or calibration solution number; j = 1 to 5.

9.3.4.4 The mean RRF is determined by the following equation:

EQ. 5

$$\overline{RRF} = \frac{\sum_{j=1}^{5} RRF}{5}$$

Where:

$\overline{RRF}$ = The mean Relative Response factor of the five initial calibration standards.

j = As defined in Equation 4.

9.3.4.5 The Percent Relative Standard Deviation (%RSD) is determined for both the native CDD/CDF and the labeled analogs by the following equation:

EQ. 6

$$\% \text{ RSD} = \frac{\textbf{Standard deviation of calibration response}}{\textbf{Mean value of calibration response}}$$

9.3.5 Technical Acceptance Criteria for Initial Calibration

9.3.5.1 All initial calibration standards must be analyzed at the concentration level and frequency described.

9.3.5.2 The isomer specificity shall be resolved with a valley of ≤ 25% in all calibration standards.

9.3.5.3 The isotopic ratios must be within the limits specified in Table 9.

9.3.5.4 The S/N ratios for the HRGC/HRMS signal in every SICP must be ≥ 10.

9.3.5.5 The RTs of the isomers must fall within the appropriate RT windows established by analysis of the WDM. The Absolute RT of $^{13}C_{12}$-1,2,3,4-TCDD shall exceed 25 minutes on the DB-5 column, and the retention time of $^{13}C_{12}$-1,2,3,4-TCDD shall exceed 15 minutes on the DB-225 column; otherwise, the GC temperature program shall be adjusted and this test repeated until the above-stated minimum RT criteria are met.

9.3.5.6 The %RSD for the RR must be ± 20% and the %RSD for the RRF must be ± 35% over the five-point calibration range.

9.3.6 Corrective Action for Initial Calibration

9.3.6.1 If the initial calibration technical acceptance criteria are not met, inspect the system for problems. It may be necessary to change columns, adjust the system, and recalibrate until all the technical acceptance criteria are met.

9.3.6.2 All initial calibration technical acceptance criteria must be met before any samples, QC samples, and required blanks are analyzed. Any analysis conducted when the technical acceptance criteria have not been met will require re-analysis at no additional cost to USEPA.

9.4 Calibration Verification

9.4.1 Summary of Calibration Verification

9.4.1.1 Calibration verification consist of verification of the Mid-Point Calibration Standard (CS3) RR and RRF.

9.4.2 Frequency of Calibration Verification

9.4.2.1 A CS3 standard must be analyzed once at the beginning of each 12-hour period during which sample data are collected, but after the Column Performance Solution (CPS). The 12-hour time period begins with the injection of the CPS.

9.4.2.2 The CS3 standard must also be analyzed at the end of each 12-hour shift or analytical sequence. This analysis may also be used to establish the beginning of the next 12-hour shift or analytical sequence.

9.4.3 Procedure for Calibration Verification

9.4.3.1 Inject 1 or 2 µL of the CS3 calibration standard and measure the SICP areas for the analytes and compute the ion abundance ratios at the exact m/z's. Compare the ratio to the theoretical ratio. Verify that the system meets the ion abundance ratios, the minimum S/N ratios and RT criteria. Compute the RR and RRF by the isotope dilution and internal standard methods, respectively. Determine the Percent Difference (%D) between the mean RR/RRF from the initial calibration and the calibration verification RR/RRF.

9.4.4 Calculations for Calibration Verification

9.4.4.1 Calculate the RR and RRF according to Equations 2 and 3.

9.4.4.2 The Percent Difference (%D) between the initial calibration and the calibration verification response for each target and labeled analyte is determined by the following:

EQ. 7

Where:

$$\%D = \frac{\mathbf{Response_{ver}} - \mathbf{Response_{INT}}}{\mathbf{Response_{INT}}}$$

$Response_{ver}$ = Response established during calibration verification.

$Response_{INT}$ = Mean response established during initial calibration according to Equations 4 and 5.

9.4.5 Technical Acceptance Criteria for Calibration Verification

9.4.5.1 All CDDs/CDFs in the standard (both native and labeled) must be within their respective ion abundance ratios.

9.4.5.2 The absolute RT of the internal standard $^{13}C_{12}$-1,2,3,4-TCDD must exceed 25 minutes on the DB-5 column, and the RT must exceed 15 minutes on the DB-225 column. In addition, the absolute RT of the internal standards must be within ± 15 seconds of the RTs obtained during initial calibration.

9.4.5.3 The RRTs of the native and labeled CDDs/CDFs shall be within the limits defined in Table 2.

9.4.5.4 The Percent Difference (%D) between the calibration verification RR and the mean RR from the initial calibration must be within ± 25%. The Percent Difference between the calibration verification RRF and the mean RRF from the initial calibration must be within ± 35%.

9.4.5.5 The peaks representing both native and labeled analytes in the CS3 standard must have a S/N ratio greater than or equal to 10.

9.4.6 Corrective Action for Calibration Verification

9.4.6.1 Calibration Verification technical acceptance criteria must be met before any samples, QC samples, and required blanks are analyzed. Any analysis conducted when the technical acceptance criteria have not been met will require re-analysis at no additional cost to USEPA.

9.2.6.2 If the technical acceptance criteria at the end of the 12-hour shift or analytical sequence are not met, all samples analyzed in that shift or analytical sequence will be reanalyzed at no additional cost to USEPA.

9.4.6.3 If the calibration verification technical acceptance criteria are not met, inspect the system for problems. It may be necessary to change columns, adjust the system,

recalibrate with fresh calibration standards.

9.5 Analytical Sequence

Time	Analysis
Hour 0 Start of First 12-Hour Period	PFK HRMS Tune Window Defining Mixture (WDM) Isomer Specificity Check (ISC) Note: WDM can be combined with the ISC as a Column Performance Solution (CPS) CS3 CS1 (initial calibration) CS2 CS4 CS5 Blanks, Laboratory Control Samples (LCSs), Samples (if time still remains on the 12-hour clock)
Beginning of Next 12-Hour Period	PFK HRMS Tune CPS CS3 Blanks, LCSs, Samples

10.0 PROCEDURE

10.1 Sample Preparation

10.1.1 Sample preparation involves modifying the physical form of the sample so that the chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) can be extracted efficiently. In general, the samples must be in a liquid form or in the form of finely divided solids in order for efficient extraction to take place. Table 10 lists the phases and suggested quantities for extraction of various sample matrices.

10.1.2 Multiphase/Insufficient Samples

10.1.2.1 If multiphase samples (e.g., a two-phase liquid sample) are received by the Contractor, the Contractor must contact the TOPO to apprise him of the type of sample received. If all phases of the sample are amenable to analysis, the TOPO may require the Contractor to do any of the following:

- Mix the sample and analyze an aliquot from the homogenized sample;
- Separate the phases of the sample and analyze each phase individually. The TOPO will provide EPA sample numbers for the additional phases;
- Separate the phases and analyze one or more of the phases, but not all of the phases. The TOPO will provide EPA sample numbers for the additional phases, if required; or
- Not analyze the sample.

10.1.2.2 If an insufficient sample amount (less than the required amount) is received to perform the analyses, the Contractor must contact the TOPO to apprise him of the problem. The TOPO will either require that no sample analyses be performed, or a reduced volume be used for the sample analysis. No other changes in the analyses will be permitted. The Contractor must document the TOPO's decision in the Sample Delivery Group (SDG) Narrative.

10.1.3 Water Samples

Water samples visibly absent of particles are extracted directly using the separatory funnel (see Section 10.2.1) or Solid Phase Extraction (SPE) technique (see Section

10.2.2). Water samples containing visible particles and containing 1% suspended solids or less are prepared according to Section 10.1.3.1 and extracted using the SPE technique, followed by Soxhlet/Dean-Stark (SDS) extraction (see Section 10.2.3), or are filtered using the procedure in Section 10.1.3.1.6. After filtration, the particles and filter are extracted using the SDS procedure (see Section 10.2.3) and the filtrate is extracted using the separatory funnel procedure (see Section 10.2.1). For aqueous samples containing greater than one percent solids, a sample aliquot sufficient to provide 10 g of dry solids is used, as described in Section 10.1.4.2.

10.1.3.1 Preparation of Water Samples

10.1.3.1.1 Mark the original level of the sample on the sample bottle for reference. Weigh the sample plus bottle to ± 1 g.

10.1.3.1.2 Spike 1 mL of the diluted labeled compound spiking solution (see Section 7.7.4.2) into the sample bottle. Cap the bottle and mix the sample by careful shaking. Allow the sample to equilibrate for 1 to 2 hours, with occasional shaking.

10.1.3.1.3 For each sample or sample batch (to a maximum of 20 samples) to be extracted during the same 12-hour shift, place two 1 L aliquots of reagent water in clean sample bottles or flasks.

10.1.3.1.4 Spike 1 mL of the diluted labeled compound spiking solution (see Section 7.7.4.2) into the two reagent water aliquots. One of these aliquots will serve as the blank and the other will serve as the Laboratory Control Sample (LCS). Spike the LCS with 1 mL of the LCS spiking solution (see Section 7.8.4).

10.1.3.1.5 If SPE is to be used, add 5 mL of methanol to the sample, cap and shake the sample to mix thoroughly, and proceed to Section 10.2.2 for extraction. If SPE is not to be used, and the sample is visibly absent of particles, proceed to Section 10.2.1 for extraction. If SPE is not to be used and the sample contains visible particles, proceed to the following section for filtration of particles.

10.1.3.1.6 Filtration of Particles

10.1.3.1.6.1 Assemble a Buchner funnel on top of a clean filtration flask. Apply vacuum to the flask and pour the entire contents of the sample bottle through a glass fiber filter in the Buchner funnel, swirling the sample remaining in the bottle to suspend any particulate.

10.1.3.1.6.2 Rinse the sample bottle twice with approximately 5 mL portions of reagent water to transfer any remaining particulate onto the filter.

10.1.3.1.6.3 Rinse any particulate off the sides of the Buchner funnel with small quantities of reagent water.

10.1.3.1.6.4 Weigh the empty sample bottle to ± 1 g. Determine the weight of the sample by difference. Save the bottle for further use.

10.1.3.1.6.5 Extract the filtrates using the separatory funnel procedure in Section 10.2.1.

10.1.3.1.6.6 Extract the filter containing the particulate using the SDS procedure in Section 10.2.3.

10.1.4 Soil/Sediment Samples

Mix samples thoroughly, especially composite samples. Discard any foreign objects such as sticks, leaves, and rocks. Also, decant and discard any standing water phase.

10.1.4.1 Determination of Percent Solids (%Solids)

Weigh 5 to 10 g of sample to three significant figures into a tared beaker. This aliquot is used for determining the Percent Solids content of the sample, not for analysis of CDDs/CDFs. Dry for a minimum of 12 hours at 110 ± 5°C, and cool in a desiccator. Calculate Percent Solids as follows:

EQ.8

$$\%\text{Solids} = \frac{\text{Weight of Sample Aliquot After Drying}}{\text{Weight of Sample Aliquot Before Drying}} \times 100$$

10.1.4.2 Preparation of Soil/sediment Samples

10.1.4.2.1 Weigh a well-mixed aliquot of each sample (of the same matrix type) sufficient to provide 10 g of dry soil/sediments (based on the soil/sediments determination in Section 10.1.4.1) into a clean beaker or glass jar. Record sample weight to the nearest 0.01 g.

10.1.4.2.2 Spike 1.0 mL of the diluted labeled compound spiking solution (see Section 7.7.4.2) into the sample.

10.1.4.2.3 For each sample or sample batch (to a maximum of 20 samples) to be extracted during the same 12-hour shift, weigh two 10 g aliquots of the appropriate reference matrix into clean beakers or glass jars.

10.1.4.2.4 Spike 1.0 mL of the diluted labeled compound solution into each reference matrix aliquot. One aliquot will serve as the blank and the other will serve as the LCS. Spike the LCS with 1.0 mL of the LCS spiking solution (see Section 7.8.4).

10.1.4.2.5 Stir or tumble and equilibrate the aliquots for 1 to 2 hours.

10.1.4.2.6 Decant excess water. If necessary to remove water, filter the sample through a glass fiber filter and discard the liquid.

10.1.4.2.7 If particles greater than 1 mm are present in the sample, spread the sample on clean aluminum foil. After the sample is dry, grind to reduce the particle size.

10.1.4.2.8 Extract the sample and aliquots using the SDS procedure in Section 10.2.3.

10.1.5 Tissue Samples

Prior to processing tissue samples, the laboratory must determine the exact tissue to be analyzed. Common requests for analysis of fish tissue include whole fish skin on, whole fish skin removed, edible fish fillets (filleted in the field or by the laboratory), specific organs, and other portions. Once the appropriate tissue has been determined, the sample must be homogenized.

10.1.5.1 Homogenization

10.1.5.1.1 Each analysis requires 10g of tissue (wet weight). Therefore, the laboratory should homogenize at least 20 g of tissue to allow for re-extraction of a second aliquot of the same homogenized sample, if re-analysis is required. When whole fish analysis is necessary, the entire fish is homogenized.

10.1.5.1.2 Homogenize the sample in a tissue homogenizer or grind in a meat grinder. Cut tissue that is too large to feed into the grinder into smaller pieces. To assure homogeneity, grind three times.

10.1.5.2 Preparation of Tissue Samples

10.1.5.2.1 Transfer approximately 10 g (wet weight) of homogenized tissue to a clean, tared, 400 to 500 mL beaker. For the alternate HCl digestion/extraction,

transfer the tissue to a clean, tared 500 to 600 mL wide mouth bottle. Record the weight to the nearest 0.01 g.

10.1.5.2.2 Prepare the blank and LCS by adding approximately 10 g of the tissue reference matrix to a 400 to 500 mL beaker. For the alternate HCl digestion/extraction, add the reference matrix to a 500 to 600 mL wide mouth bottle. Record the weight to the nearest 0.01 g.

10.1.5.2.3 Spike 1.0 mL of the labeled compound spiking solution diluted in acetone (see Section 7.7.4.2) into the samples, blank, and LCS. Spike the LCS with 1 mL of the LCS spiking solution (see Section 7.8.4).

10.1.5.2.4 Extract the aliquots using the Soxhlet extraction or HCL digestion/extraction and concentration procedures in Sections 10.2.4 and 10.2.5.

10.1.6 Oily Samples

Prior to processing oily samples, the laboratory must determine the exact nature of the samples to be analyzed. Oily samples could be oily soils, oily sludges, wet fuel oil, or pure oil. Mix samples thoroughly, especially composite samples. Discard any foreign objects such as sticks, leaves, and rocks. Decant and discard any standing water phase.

10.1.6.1 Weigh 2 grams of sample into a clean beaker or glass jar. Record the sample weight to the nearest 0.01 g.

10.1.6.2 Spike 1 mL of the diluted labeled compound spiking solution (see Section 10.1.3.1.2) into the sample.

10.1.6.3 For each sample or sample batch (to a maximum of 20 samples) to be extracted during the same 12-hour shift, weigh 2 g aliquots of the appropriate reference matrix into clean beakers or glass jars.

10.1.6.4 Spike 1 mL of the diluted labeled compound spiking solution into each reference matrix aliquot. One aliquot will serve as the blank and the other will serve as the LCS. Spike the LCS with 1 mL of the LCS spiking solution (see Section 7.8.4).

10.1.6.5 Stir or tumble and equilibrate the aliquots for 1 to 2 hours.

10.1.6.6 Decant excess water. If necessary to remove water, filter the sample through a glass fiber filter, and discard the liquid.

10.1.6.7 If particles greater than 1mm are present in the sample, spread the sample on clean aluminum foil. After the sample is dry, grind to reduce particle size.

10.1.6.8 Extract the sample and aliquots using the SDS procedure in Section 10.2.3.

10.2 Extraction

Extraction procedures include separatory funnel (see Section 10.2.1) and SPE (see Section 10.2.2) for waters, SDS (see Section 10.2.3) for soil/sediments, and Soxhlet extraction (see Section 10.2.4) and HCl digestion (see Section 10.2.5) for tissues. Acid/base back extraction (see Section 10.2.6) is used for initial cleanup of extracts.

10.2.1 Separatory Funnel Extraction

10.2.1.1 Pour the spiked sample (see Section 10.1.3.1.2) or filtrate (see Section 10.1.3.1.6.5) into a 2 L separatory funnel. Rinse the bottle or flask twice with 5 mL of reagent water and add these rinses to the separatory funnel.

10.2.1.2 Add 60 mL methylene chloride to the sample bottle (see Sections 10.1.3.1.1 or 10.1.3.1.6.5), seal, and shake for 60 seconds to rinse the inner surface. Transfer the solvent to the separatory funnel and extract the sample by shaking the funnel for 2 minutes with periodic venting. Allow the organic layer to separate from the water phase for a minimum of 10 minutes. If an emulsion forms

and is more than one-third the volume of the solvent layer, employ mechanical techniques to complete the phase separation. Drain the methylene chloride extract through a solvent-rinsed glass funnel that is approximately one-half full with granular anhydrous sodium sulfate supported on clean glass fiber filter paper into a solvent-rinsed concentration device (see Section 10.3).

10.2.1.3 Extract the water sample two more times with 60 mL portions of methylene chloride. Drain each portion through the sodium sulfate into the concentrator. After the third extraction, rinse the separatory funnel with at least 20 mL of methylene chloride, and drain this rinse through the sodium sulfate into the concentrator. Repeat this rinse at least twice. Set aside the funnel with sodium sulfate if the extract is to be combined with the extract from the particulate.

10.2.1.4 Concentrate the extract using one of the macro-concentration procedures (see Section 10.3).

10.2.1.4.1 Adjust the final volume of the concentrated extract to approximately 10 mL with hexane, transfer to a 250 mL separatory funnel, and back-extract using the procedure in Section 10.2.6.

10.2.1.4.2 If the extract is from the water filtrate (see Section 10.1.3.1.6.5), set aside the Kuderna-Danish (K-D) apparatus for addition of the SDS extract from the particulate (see Section 10.2.3.9).

10.2.2 Solid Phase Extraction (SPE)

10.2.2.1 Disk Preparation

10.2.2.1.1 Place a 90 mm glass fiber filter on top of a 90 mm SPE disk on the glass frit support of a clean filtration apparatus and wet with toluene. Clamp the filter and SPE disk between a 1 L glass reservoir and a 2 L vacuum filtration flask.

10.2.2.1.2 Rinse the sides of the filtration flask with approximately 15 mL of toluene using a squeeze bottle or syringe. Apply vacuum momentarily until a few drops appear at the drip tip. Release the vacuum and allow the filter/disk to soak for approximately one minute. Apply vacuum and draw all of the toluene through the filter/disk. Repeat the wash step with approximately 15 mL of acetone and allow the filter/disk to air dry.

10.2.2.1.3 Re-wet the filter/disk with approximately 15 mL of methanol, allowing the filter/disk to soak for approximately one minute. Pull the methanol through the filter/disk using the vacuum, but retain a layer of methanol (approximately 1 mm thick) on the filter. Do not allow the disk to go dry from this point until the end of the extraction.

10.2.2.1.4 Rinse the filter/disk with two 50 mL portions of reagent water by adding the water to the reservoir and pulling most through, leaving a layer of water on the surface of the filter.

10.2.2.2 Extraction

10.2.2.2.1 Add the spiked sample (see Section 10.1.3.1.2), blank (see Section 10.1.3.1.4), or LCS to the reservoir and turn on the vacuum to begin the extraction. Adjust the vacuum to complete the extraction in no less than 10 minutes. For samples containing high particulate (suspended solids), filtration times may be 8 hours or longer.

10.2.2.2.2 If the filter clogs with particles and more rapid extraction is desired, replace the filter during the extraction by pulling the sample in the reservoir into the sample bottle to the level of the filter/disk (keeping the disk wet), removing the clamp and reservoir, and carefully removing the filter with tweezers. Place the filter in a clean glass Petri dish and cover. Label with the Sample ID. Re-assemble the apparatus with a clean filter and proceed with the extraction. Pull the sample through the filter/disk, leaving a layer of water on the surface of the filter.

10.2.2.2.3 Rinse the sample bottle with approximately 50 mL of reagent water to remove any soil/sediments, and pour into the reservoir. Pull through the filter/disk. Use additional reagent water rinses until all visible soil/sediments are removed.

10.2.2.2.4 After the sample and rinses have passed through the filter/disk, rinse the sides of the reservoir with small portions of reagent water. Allow the filter/disk to dry, then remove the filter and disk and place in the glass Petri dish. Extract the filter(s) and disk per the SDS extraction procedure in Section 10.2.3.

10.2.3 Soxhlet/Dean-Stark (SDS) Extraction

10.2.3.1 Charge a clean extraction thimble with 5.0 g of 100/200-mesh silica topped with 100 g of quartz sand.

NOTE: Do not disturb the silica layer throughout the extraction process.

10.2.3.2 Place the thimble in a clean extractor. Place 30 to 40 mL of toluene in the receiver and 200 to 250 mL of toluene in the flask.

10.2.3.3 Pre-extract the glassware by heating the flask until the toluene is boiling. When properly adjusted, 1 to 2 drops of toluene per second will fall from the condenser tip into the receiver. Extract the apparatus for a minimum of 3 hours.

10.2.3.4 After pre-extraction, cool, and disassemble the apparatus. Rinse the thimble with toluene and allow to air dry.

10.2.3.5 Load the wet sample from Sections 10.1.3.1.6.6 and 10.1.4.2.8 and any non-water liquid into the thimble and manually mix into the sand layer with a clean metal spatula, carefully breaking up any large lumps of sample. If the material to be extracted is the particulate matter from the filtration of a water sample, or the filter(s) and disk from the SPE extraction, add these items to the thimble also.

10.2.3.6 Re-assemble the pre-extracted SDS apparatus and add a fresh charge of toluene to the receiver and reflux flask. Apply power to the heating mantle to begin refluxing. Adjust the reflux rate to match the rate of percolation through the sand and silica beds until water removal lessens the restriction to toluene flow. Frequently check the apparatus for foaming during the first 2 hours of extraction. If foaming occurs, reduce the reflux rate until foaming subsides.

10.2.3.7 Drain the water from the receiver at 1 to 2 hours and 8 to 9 hours, or sooner if the receiver fills with water. Reflux the sample for a total of 16 to 24 hours. Cool and disassemble the apparatus. Record the total volume of water collected.

10.2.3.8 Remove the distilling flask. Drain the water from the Dean-Stark receiver and add any toluene in the receiver to the extract in the flask.

10.2.3.9 Concentrate the extract using the procedures in Section 10.3, as follows:

10.2.3.9.1 Extracts from the particulate portion of a water sample containing less than 1% solids (see Section 10.1.3.1.6.6).

10.2.3.9.1.1 Concentrate the extract to approximately 5 mL using the heating mantle or rotary evaporation procedures in Sections 10.3.2 or 10.3.1.

10.2.3.9.1.2 Quantitatively transfer the extract through the sodium sulfate (see Section 10.2.1.3) into the apparatus that was set aside (see Section 10.2.1.4.2) and reconcentrate to the level of the toluene.

10.2.3.9.1.3 Adjust to approximately 10 mL with hexane, transfer to a 250 mL separatory funnel, and proceed with backextraction (see Section 10.2.6).

10.2.3.9.2 Extracts from soil/sediments (see Section 10.1.4) or from the SPE filter(s) and disk. Concentrate to approximately 10 mL using the rotary evaporator or heating mantle (see Sections 10.3.1 or 10.3.2), transfer to a 250 mL separatory funnel, and proceed with back extraction (see Section 10.2.6).

10.2.4 Soxhlet Extraction

10.2.4.1 Add 30 to 40 g of powdered anhydrous sodium sulfate to each of the beakers (see Section 10.1.5.2.1) and mix thoroughly to form a dry free flowing powder. Remix prior to extraction to prevent clumping.

10.2.4.2 Assemble and pre-extract the Soxhlet apparatus per Section 10.2.3, however, use the methylene chloride:hexane (1:1) mixture for the pre-extraction and rinsing and omit the quartz sand. The D-S moisture trap may also be omitted, if desired.

10.2.4.3 Re-assemble the pre-extracted Soxhlet apparatus and add a fresh charge of methylene chloride:hexane to the reflux flask.

10.2.4.4 Transfer the sample/sodium sulfate mixture to the Soxhlet thimble and install the thimble in the Soxhlet apparatus.

10.2.4.5 Rinse the beaker with several portions of solvent mixture and add to the thimble. Fill the thimble/receiver with solvent. Extract for 18 to 24 hours.

10.2.4.6 After extraction, cool and disassemble the apparatus.

10.2.4.7 Quantitatively transfer the extract to a macro-concentration device and concentrate to near dryness. Set aside the apparatus for re-use.

10.2.4.8 Complete the removal of the solvent using the blowdown procedure (see Section 10.4.7) and a water bath temperature of 60°C. Weigh the receiver, record the weight, and return the receiver to the blowdown apparatus, concentrating the residue until a constant weight is obtained.

10.2.4.9 Percent Lipids (% Lipids) Determination

The lipid content is determined by extracting of tissue with the same solvent system (methylene chloride:hexane) that was used in USEPA's National Dioxin Study so that lipid contents are consistent with that study.

10.2.4.9.1 Redissolve the residue in the concentration device in hexane and spike 1.0 mL of the cleanup standard into the extract.

10.2.4.9.2 Transfer the residue/hexane to the anthropogenic isolation column or the narrow-mouth 100 to 200 mL bottle, retaining the boiling chips in the K-D receiver. Use several rinses to assure that all material is transferred to a maximum hexane volume of approximately 70 mL. If necessary, sonicate or heat the receiver slightly to assure that all material is re-dissolved. Allow the receiver to dry. Weigh the receiver and boiling chips.

10.2.4.9.3 Calculate the lipid content to the nearest three significant figures using the following equation:

EQ. 9

$$\textbf{Percent Lipid} = \frac{\textbf{Weight of residue (g)}}{\textbf{Weight of tissue (g)}} \times 100$$

10.2.4.9.4 It is not necessary to determine the lipid content of the blank and LCS aliquots.

10.2.5 HCl Digestion/Extraction

10.2.5.1 Add 200 mL of 6-N HCl and 200 mL of methylene chloride:hexane (1:1) to the sample and Quality Control (QC) aliquots (see Section 10.1.5.2).

10.2.5.2 Cap and shake each bottle 1 to 3 times. Loosen cap in a hood to vent excess pressure. Cap and shake each bottle for 10 to 30 seconds. Loosen cap in a hood to vent excess pressure.

10.2.5.3 Tightly cap and place on shaker. Adjust the shaker action and speed so that the acid, solvent, and tissue are in constant motion. However, take care to avoid such violent action that the bottle may be dislodged from the shaker. Shake for 12 to 24 hours.

10.2.5.4 After digestion, remove the bottles from the shaker. Allow the bottles to stand so that the solvent and acid layers separate.

10.2.5.5 Decant the solvent through a glass funnel with glass fiber filter containing approximately 10 g of granular anhydrous sodium sulfate into a macro-concentration apparatus (see Section 10.3). Extract the contents of the bottle with two 25 mL portions of hexane and pour through the sodium sulfate into the apparatus.

10.2.5.6 Concentrate the solvent to near dryness using a macro-concentration procedure (see Section 10.3).

10.2.5.7 Complete the removal of the solvent using the blowdown apparatus (see Section 10.4.7) and a water bath temperature of 60°C. Weigh the receiver, record the weight, and return the receiver to the blowdown apparatus, concentrating the residue until a constant weight is obtained.

10.2.5.8 Percent Lipids Determination

Determine the lipid content per the procedure described in Section 10.2.4.9.

10.2.5.9 Clean up the extract per Section 10.5.

10.2.6 Back Extraction with Base and Acid

10.2.6.1 Spike 1.0 mL of the cleanup standard into the separatory funnels containing the sample and QC extracts (see Sections 10.2.1.4.1 or 10.2.3.9.1.3).

10.2.6.2 Partition the extract against 50 mL of potassium hydroxide solution (see Section 7.1.1). Shake for 2 minutes with periodic venting into a hood. Remove and discard the water layer. Repeat the base washing until no color is visible in the water layer, to a maximum of four washings. Minimize contact time between the extract and the base to prevent degradation of the CDDs/CDFs. Stronger potassium hydroxide solutions may be employed for back extraction, provided that the laboratory meets the specifications for labeled compound recovery.

10.2.6.3 Partition the extract against 50 mL of sodium chloride solution in the same way as with base. Discard the water layer.

10.2.6.4 Partition the extract against 50 mL of sulfuric acid in the same way as with base. Repeat the acid washing until no color is visible in the water layer, to a maximum of four washings.

10.2.6.5 Repeat the partitioning against sodium chloride solution and discard the water layer.

10.2.6.6 Pour each extract through a drying column containing 7 to 10 cm of granular anhydrous sodium sulfate. Rinse the separatory funnel with 30 to 50 mL of solvent and pour through the drying column. Collect each extract in a round-bottom flask. Reconcentrate the sample and QC aliquots per Sections 10.3 and 10.4, and clean up the samples and QC aliquots per Section 10.5.

10.3 Macro-Concentration

Extracts in toluene are concentrated using a rotary evaporator or a heating mantle. Extracts in methylene chloride or hexane are concentrated using a rotary evaporator, heating mantle, or K-D apparatus.

10.3.1 Rotary Evaporation

Concentrate the extracts in separate round-bottom flasks.

10.3.1.1 Assemble the rotary evaporator according to manufacturer's instructions, and warm the water bath to 45°C. On a daily basis, pre-clean the rotary evaporator by concentrating 100 mL of clean extraction solvent through the system. Archive both the concentrated solvent and the solvent in the catch flask for a contamination check if necessary. Between samples, three 2 to 3 mL aliquots of solvent should be rinsed down the feed tube into a waste beaker.

10.3.1.2 Attach the round-bottom flask containing the sample extract to the rotary evaporator. Slowly apply vacuum to the system, and begin rotating the sample flask.

10.3.1.3 Lower the flask into the water bath and adjust the speed of rotation and the temperature as required to complete the concentration in 15 to 20 minutes. At the proper rate of concentration, the flow of solvent into the receiving flask will be steady, but no bumping or visible boiling of the extract will occur.

NOTE: If the rate of concentration is too fast, analyte loss may occur.

10.3.1.4 When the liquid in the concentration flask has reached an apparent volume of approximately 2 mL, remove the flask from the water bath and stop the rotation. Slowly and carefully admit air into the system. Be sure not to open the valve so quickly that the sample is blown out of the flask. Rinse the feed tube with approximately 2 mL of solvent.

10.3.1.5 Transfer the extract to a vial using three 2 to 3 mL rinses of solvent. Proceed to Section 10.2.6 for back extraction with base and acid, or to Section 10.4 for micro-concentration and solvent exchange.

10.3.2 Heating Mantle

Concentrate the extracts in separate round-bottom flasks.

10.3.2.1 Add 1 to 2 clean boiling chips to the round-bottom flask and attach a three ball macro Snyder column. Pre-wet the column by adding approximately 1 mL of solvent through the top. Place the round-bottom flask in a heating mantle and apply heat as required to complete the concentration in 15 to 20 minutes. At the proper rate of distillation, the balls of the column will actively chatter but the chambers will not flood.

10.3.2.2 When the liquid has reached an apparent volume of approximately 10 mL, remove the round-bottom flask from the heating mantle and allow the solvent to drain and cool for at least 10 minutes. Remove the Snyder column and rinse the glass joint into the receiver with small portions of solvent.

10.3.2.3 Proceed to Section 10.2.6 for back extraction with base and acid or to Section 10.4 for micro-concentration and solvent exchange.

10.3.3 Kuderna-Danish (K-D) Apparatus

Concentrate the extracts in separate 500 mL K-D flasks equipped with 10 mL concentrator tubes.

10.3.3.1 Add 1 to 2 clean boiling chips to the receiver. Attach a three ball macro Snyder column. Pre-wet the column by adding approximately 1 mL of solvent (methylene chloride or hexane, as appropriate) through the top. Place the K-D apparatus in a hot water bath so that the entire lower rounded surface of the flask is bathed with steam.

10.3.3.2 Adjust the vertical position of the apparatus and the water temperature as required to complete the concentration in 15 to 20 minutes. At the proper rate of distillation, the balls of the column will actively chatter, but the chambers will not flood.

10.3.3.3 When the liquid has reached an apparent volume of 1 mL, remove the K-D apparatus from the bath and allow the solvent to drain and cool for at least 10 minutes. Remove the Snyder column and rinse the flask and its lower joint into the

concentrator tube with 1 to 2 mL of methylene chloride. A 5 mL syringe is recommended for this operation.

10.3.3.4 Remove the three ball Snyder column, add a fresh boiling chip, and attach a two ball micro Snyder column to the concentrator tube. Pre-wet the column by adding approximately 0.5 mL of solvent through the top. Place the apparatus in the hot water bath.

10.3.3.5 Adjust the vertical position and the water temperature as required to complete the concentration in 5 to 10 minutes. At the proper rate of distillation, the balls of the column will actively chatter but the chambers will not flood.

10.3.3.6 When the liquid reaches an apparent volume of 0.5 mL, remove the apparatus from the water bath and allow to drain and cool for at least 10 minutes.

10.3.3.7 Proceed to Section 10.2.6 for back extraction with base and acid or to Section 10.4 for micro-concentration and solvent exchange.

10.4 Micro-Concentration and Solvent Exchange

10.4.1 Extracts to be subjected to Gel Permeation Chromatography (GPC) or High Performance Liquid Chromatograph (HPLC) cleanup are exchanged into methylene chloride. Extracts that are to be cleaned up using silica gel, alumina, carbon, and/or Florisil are exchanged into hexane.

10.4.2 Transfer the vial containing the sample extract to a nitrogen evaporation device. Adjust the flow of nitrogen so that the surface of the solvent is just visibly disturbed.

NOTE: A large vortex in the solvent may cause analyte loss.

10.4.3 Lower the vial into a 45°C water bath and continue concentrating.

10.4.4 When the volume of the liquid is approximately 100 µL, add 2 to 3 mL of the desired solvent (methylene chloride or hexane) and continue concentration to approximately 100 µL. Repeat the addition of solvent and concentrate once more.

10.4.5 If the extract is to be cleaned up by GPC or HPLC, adjust the volume of the extract to 5.0 mL with methylene chloride. Proceed with GPC cleanup (see Section 10.5.1).

10.4.6 If the extract is to be cleaned up by column chromatography (alumina, silica gel, Carbopak/Celite), bring the final volume to 1.0 mL with hexane. Proceed with column cleanups (see Sections 10.5.2 through 10.5.5).

10.4.7 For extracts to be concentrated for injection into the HRGC/HRMS, quantitatively transfer the extract to a 0.3 mL conical vial for final concentration, rinsing the larger vial with hexane and adding the rinse to the conical vial. Reduce the volume to approximately 100 µL. Add 10 µL of nonane to the vial, and evaporate the solvent to the level of the nonane. Seal the vial and label with the sample number. Store in the dark at room temperature until ready for HRGC/HRMS analysis.

10.4.8 For extracts to be concentrated to dryness for weight determination, blow dry until a constant weight is obtained.

10.5 Cleanup

Cleanup may not be necessary for relatively clean samples (e.g., treated effluents, groundwater, drinking water). If particular circumstances require the use of a cleanup procedure, the analyst may use any or all of the following procedures or any other appropriate procedure. Before using a cleanup procedure, the analyst must demonstrate that the requirements for the cleanup standard listed in Table 7 are met using the cleanup procedure. GPC (see Section 10.5.1) removes many high molecular weight interferences that cause GC column performance to degrade. It should be used for all soil and sediment extracts and may be used for water extracts that are expected to contain high molecular weight organic compounds (e.g., polymeric materials, humic acids). If other cleanup techniques prove adequate, they may be used in lieu of GPC.

Acid, neutral, basic silica gel, alumina and Florisil (see Sections 10.5.2, 10.5.3, and 10.5.7) are used to remove non-polar and polar interferences. Alumina and Florisil are used to remove chlorodiphenyl ethers. Carbopak/Celite (see Section 10.5.4) is used to remove nonpolar interferences. HPLC (see Section 10.5.5) is used to provide specificity for the 2,3,7,8-substituted and other CDD and CDF isomers. The anthropogenic isolation column (see Section 10.5.6.1), acidified silica gel batch adsorption procedure (see Section 10.5.6.2), and sulfuric acid back extraction (see Section 10.5.6.3) are used for removal of lipids from tissue samples.

10.5.1 Sample Cleanup by GPC

10.5.1.1 Introduction

GPC is a size exclusion cleanup procedure using organic solvents and hydrophobic gels in the separation of natural (and synthetic) macromolecules. The packing gel is porous and is characterized by the range or uniformity (exclusion range) of that pore size. In the choice of gels, the exclusion range must be larger than the molecular size of the molecules to be separated.

10.5.1.2 Column Packing

10.5.1.2.1 Place 70 to 75 g of SX-3 Bio-beads in a 400 to 500 mL beaker.

10.5.1.2.2 Cover the beads with methylene chloride and allow to swell overnight (for a minimum of 12 hours).

10.5.1.2.3 Transfer the swelled beads to the column and pump solvent through the column, from bottom to top, at 4.5 to 5.5 mL/min prior to connecting the column to the detector.

10.5.1.2.4 After purging the column with solvent for 1 to 2 hours, adjust the column head pressure to 7 to 10 psig, and purge for 4 to 5 hours to remove air. Maintain a head pressure of 7 to 10 psig. Connect the column to the detector.

10.5.1.3 Calibration of GPC

10.5.1.3.1 Summary of Calibration

The GPC calibration procedure is based on monitoring the elution of standards with an Ultraviolet (UV) detector connected to the GPC column.

10.5.1.3.2 Frequency of GPC Calibration

Each GPC system must be initially calibrated upon award of a contract, when the column is changed, when channeling occurs, and once every seven days when samples, including matrix spikes, duplicates, and blanks, are cleaned up using GPC.

10.5.1.3.3 Procedure for GPC Calibration

10.5.1.3.3.1 Load 5 mL of the GPC calibration solution into the sample loop.

10.5.1.3.3.2 Inject the calibration solution and record the signal from the detector. The elution pattern will be corn oil, bis (2-ethyl hexyl) phthalate, pentachlorophenol, perylene, and sulfur.

10.5.1.3.3.3 Set the "dump time" to allow greater than 85% removal of the corn oil and greater than 85% collection of the phthalate.

10.5.1.3.3.4 Set the "collect time" to the peak minimum between perylene and sulfur.

10.5.1.3.4 Technical Acceptance Criteria for GPC Calibration

10.5.1.3.4.1 The GPC system must be calibrated at the frequency described in Section 10.5.1.3.2.

10.5.1.3.4.2 Verify the calibration with the calibration solution after every 20 extracts.

10.5.1.3.4.3 Calibration is verified if the recovery of the pentachlorophenol is greater than 85%.

10.5.1.3.5 Corrective Action for GPC Calibration

10.5.1.3.5.1 If calibration does not meet the technical acceptance criteria, the system shall be re-calibrated using the calibration solution, and the previous 20 samples shall be re-extracted and cleaned up using the calibrated GPC system.

10.5.1.4 Sample Extract Cleanup by GPC

GPC requires that the column not be overloaded. The column specified in this method is designed to handle a maximum of 0.5 g of high molecular weight material in a 5 mL extract. If the extract is known or expected to contain more than 0.5 g, the extract is split into aliquots for GPC and the aliquots are combined after elution from the column. The residue content of the extract may be obtained gravimetrically by evaporating the solvent from a 50 µL aliquot.

10.5.1.4.1 Frequency of GPC Sample Cleanup

GPC cleanup may be performed for soil/sediment and water extracts that contain high molecular weight contaminants that interfere with the analysis of the target analytes. In this case GPC must also be performed for all associated blanks, and LCS.

10.5.1.4.2 Procedure for GPC Sample Cleanup

10.5.1.4.2.1 Filter the extract or load through the filter holder to remove any particulate. Load the 5.0 mL extract onto the column.

10.5.1.4.2.2 Elute the extract using the calibration data determined in Section 10.5.1.3. Collect the eluate in a clean 400 to 500 mL beaker.

10.5.1.4.2.3 Rinse the sample loading tube thoroughly with methylene chloride between extracts to prepare for the next sample.

10.5.1.4.2.4 If a particularly dirty extract is encountered, a 5.0 mL methylene chloride blank shall be run through the system to check for carry-over.

10.5.1.4.2.5 Concentrate the eluate per Sections 10.3 or 10.4 for further cleanup or for injection into the HRGC/HRMS.

10.5.2 Silica Gel Cleanup

10.5.2.1 Procedure for Silica Gel Cleanup

10.5.2.1.1 Place a glass wool plug in a 15 mm ID chromatography column. Pack the column bottom to top with: 1 g silica gel; 4 g basic silica gel; 1 g silica gel; 8 g acid silica gel; 2 g silica gel, and 4 g granular anhydrous sodium sulfate. Tap the column to settle the adsorbents.

10.5.2.1.2 Pre-rinse the column with 50 to 100 mL of hexane. Close the stopcock when the hexane is within 1 mm of the sodium sulfate. Discard the eluate. Check the column for channeling. If channeling is present, discard the column and prepare another.

10.5.2.1.3 Apply the concentrated extract to the column. Open the stopcock until the extract is within 1 mm of the sodium sulfate.

10.5.2.1.4 Rinse the receiver twice with 1 mL portions of hexane and apply separately to the column. Elute the CDDs/CDFs with 100 mL hexane and collect the eluate.

10.5.2.1.5 Concentrate the eluate per Sections 10.3 or 10.4 for further cleanup or for injection into the HPLC or HRGC/HRMS.

10.5.2.1.6 For extracts of samples known to contain large quantities of other organic compounds (such as paper mill effluents), it may be advisable to increase the capacity of the silica gel column. This may be accomplished by increasing the strengths of the acid and basic silica gels. The acid silica gel may be increased in strength to as much as 44% w/w (7.9 g sulfuric acid added to 10 g silica gel). The basic silica gel may be increased in strength to as much as 33% w/w (50 mL 1 N NaOH added to 100 g silica gel), or the potassium silicate may be used.

NOTE: The use of stronger acid silica gel (44% w/w) may lead to charring of organic compounds in some extracts. The charred material may retain some of the analytes and lead to lower recoveries of CDDs/CDFs. Increasing the strengths of the acid and basic silica gel may also require different volumes of hexane than those specified above to elute the analytes off the column.

10.5.3 Alumina Cleanup

10.5.3.1 Procedure for Alumina Cleanup

10.5.3.1.1 Place a glass wool plug in a 15 mm ID chromatography column.

10.5.3.1.2 If using acid alumina, pack the column by adding 6 g acid alumina. If using basic alumina, substitute 6 g basic alumina. Tap the column to settle the adsorbents.

10.5.3.1.3 Pre-rinse the column with 50 to 100 mL of hexane. Close the stopcock when the hexane is within 1 mm of the alumina.

10.5.3.1.4 Discard the eluate. Check the column for channeling. If channeling is present, discard the column and prepare another.

10.5.3.1.5 Apply the concentrated extract to the column. Open the stopcock until the extract is within 1 mm of the alumina.

10.5.3.1.6 Rinse the receiver twice with 1 mL portions of hexane and apply separately to the column. Elute the interfering compounds with 100 mL hexane and discard the eluate.

10.5.3.1.7 The choice of eluting solvents will depend on the choice of alumina (acid or basic) made in Section 10.5.3.1.2.

10.5.3.1.7.1 If using acid alumina, elute the CDDs/CDFs from the column with 20 mL methylene chloride:hexane (20:80 v/v). Collect the eluate.

10.5.3.1.7.2 If using basic alumina, elute the CDDs/CDFs from the column with 20 mL methylene chloride:hexane (50:50 v/v). Collect the eluate.

10.5.3.1.8 Concentrate the eluate per Sections 10.3 or 10.4 for further cleanup or for injection into the HPLC or HRGC/HRMS.

10.5.4 Carbon Column Cleanup

10.5.4.1 Procedure for Carbon Column Cleanup

10.5.4.1.1 Cut both ends from a 10 mL disposable serological pipet to produce a 10 cm column. Fire polish both ends and flare both ends if desired. Insert a glass wool plug at one end, then pack the column with 0.55 g of Carbopak/Celite to form an adsorbent bed approximately 2 cm long. Insert a glass wool plug on top of the bed to hold the adsorbent in place.

10.5.4.1.2 Pre-rinse the column with 5 mL of toluene followed by 2 mL methylene chloride:methanol:toluene (15:4:1 v/v), 1 mL methylene chloride:cyclohexane (1:1 v/v), and 5 mL hexane. If the flow rate of eluate exceeds 0.5 mL/min,

discard the column.

10.5.4.1.3 When the solvent is within 1 mm of the column packing, apply the sample extract to the column. Rinse the sample container twice with 1 mL portions of hexane and apply separately to the column. Apply 2 mL of hexane to complete the transfer.

10.5.4.1.4 Elute the interfering compounds with two 3 mL portions of hexane, 2 mL of methylene chloride: cyclohexane (1:1 v/v), and 2 mL of methylene chloride: methanol:toluene (15:4:1 v/v). Discard the eluate.

10.5.4.1.5 Invert the column and elute the CDDs/CDFs with 20 mL of toluene. If carbon particles are present in the eluate, filter through glass fiber filter paper.

10.5.4.1.6 Concentrate the eluate per Sections 10.3 or 10.4 for further cleanup or for injection into the HPLC or HRGC/HRMS.

10.5.5 Sample Cleanup by High Performance Liquid Chromatography (HPLC)

10.5.5.1 Calibration of HPLC

10.5.5.1.1 Procedure for HPLC Calibration

10.5.5.1.2 Prepare a calibration standard containing the 2,3,7,8-substituted isomers and/or other isomers of interest at a concentration of approximately 500 pg/µL in methylene chloride.

10.5.5.1.3 Inject 30 µL of the calibration solution into the HPLC and record the signal from the detector. Collect the eluant for re-use. The elution order will be the tetrachlorinated through octachlorinated isomers.

10.5.5.1.4 Establish the collect time for the tetra-isomers and for the other isomers of interest. Following calibration, flush the injection system with copious quantities of methylene chloride, including a minimum of five 50 µL injections while the detector is monitored, to ensure that residual CDDs/CDFs are removed from the system.

10.5.5.2 Technical Acceptance Criteria for HPLC Calibration

10.5.5.2.1 Verify the calibration with the calibration solution after every 20 extracts.

10.5.5.2.2 Calibration is verified if the recovery of the CDDs/CDFs from the calibration standard (Section 10.5.5.1.1) is within 75 to 125%.

10.5.5.3 Corrective Action for HPLC Calibration

10.5.5.3.1 If calibration does not meet the technical acceptance criteria, the system shall be re-calibrated using the calibration solution, and the previous 20 samples shall be re-extracted and cleaned up using the calibrated system.

10.5.5.4 Sample Extract Cleanup by HPLC

HPLC requires that the column not be overloaded. The column specified in this method is designed to handle a maximum of 30 µL of extract. If the extract cannot be concentrated to less than 30 µL, it is split into fractions and the fractions are combined after elution from the column.

10.5.5.4.1 Procedure for HPLC Sample Cleanup

10.5.5.4.1.1 Rinse the sides of the vial twice with 30 µL of methylene chloride and reduce to 30 µL with the evaporation apparatus.

10.5.5.4.1.2 Inject the 30 µL extract into the HPLC.

10.5.5.4.1.3 Elute the extract using the calibration data determined in Section 10.5.5.1.3. Collect the fraction(s) in a clean 20 mL concentrator tube

containing 5 mL of hexane:acetone (1:1 v/v).

10.5.5.4.1.4 If an extract containing greater than 100 ng/mL of total CDD or CDF is encountered, a 30 µL methylene chloride blank shall be run through the system to check for carry-over.

10.5.5.4.1.5 Concentrate the eluate per Section 10.4 for injection into the HRGC/HRMS.

10.5.6 Cleanup of Tissue Lipids

Lipids are removed from the Soxhlet extract using either the anthropogenic isolation column (see Section 10.5.6.1) or acidified silica gel (see Section 10.5.6.2), or are removed from the HCl digested extract using sulfuric acid and base back extraction (see Section 10.5.6.3).

10.5.6.1 Anthropogenic Isolation Column Cleanup

10.5.6.1.1 Procedure for Anthropogenic Isolation Column Cleanup

10.5.6.1.1.1 Place a glass wool plug in a 25 mm ID chromatography column. Pack the column bottom to top with: 2 g silica gel; 2 g potassium silicate; 2 g granular anhydrous sodium sulfate; 10 g acid silica gel; and 2 g granular anhydrous sodium sulfate. Tap the column to settle the adsorbents.

10.5.6.1.1.2 Pre-elute the column with 100 mL of hexane. Drain the hexane layer to the top of the column but do not expose the sodium sulfate.

10.5.6.1.1.3 Load the sample and rinses (see Section 10.2.4.9.2) onto the column by draining each portion to the top of the bed. Elute the CDDs/CDFs from the column into the apparatus used for concentration (see Section 10.2.4.7) using 200 mL of hexane.

10.5.6.1.1.4 Concentrate the cleaned up extract to constant weight per Section 10.4.8. If more than 500 mg of material remains, repeat the cleanup using a fresh anthropogenic isolation column.

10.5.6.1.1.5 Re-dissolve the extract in a solvent suitable for the additional cleanups to be used.

10.5.6.1.1.6 Spike 1.0 mL of the cleanup standard into the residue/solvent.

10.5.6.1.1.7 Clean up the extract using the procedures in Sections 10.5.1 through 10.5.6. Alumina and carbon are recommended as minimum additional cleanup steps.

10.5.6.1.1.8 Following cleanup, concentrate the extract to 10 uL as described in Section 10.4.8, and proceed with the analysis in Section 10.6.

10.5.6.2 Acidified Silica Gel Cleanup

This procedure is an alternate to the anthropogenic isolation column that is used for the removal of lipids from the SDS extract.

10.5.6.2.1 Procedure for Acidified Silica Gel Cleanup

10.5.6.2.1.1 Adjust the volume of hexane in the bottle (see Section 10.2.4.9.2) to approximately 200 mL.

10.5.6.2.1.2 Spike 1.0 mL of the cleanup standard into the residue/solvent.

10.5.6.2.1.3 Drop the stirring bar into the bottle, place the bottle on the stirring plate, and begin stirring.

10.5.6.2.1.4 Add 30 to 100 g of acid silica gel to the bottle while stirring, keeping the silica gel in motion. Stir for 2 hours.

NOTE: 30 g of silica gel should be adequate for most samples and will minimize

contamination from this source.

10.5.6.2.1.5 After stirring, pour the extract through approximately 10 g of granular anhydrous sodium sulfate contained in a funnel with glass fiber filter into a K-D concentrator. Rinse the bottle and sodium sulfate with hexane to complete the transfer.

10.5.6.2.1.6 Concentrate the extract to a volume suitable for the cleanups given in Sections 10.5.1 - 10.5.6.

10.5.6.3 Sulfuric Acid and Base Back Extraction Cleanup

Used with HCl digested extracts (see Section 10.2.5).

10.5.6.3.1 Procedure for Sulfuric Acid and Base Back Extraction Cleanup

10.5.6.3.1.1 Spike 1.0 mL of the cleanup standard into the residue/solvent (see Section 10.2.5.7).

10.5.6.3.1.2 Add 10 mL of concentrated sulfuric acid to the bottle. Immediately cap and shake 1 to 3 times. Loosen cap in a hood to vent excess pressure. Cap and shake the bottle so that the residue/solvent is exposed to the acid for a total time of approximately 45 seconds.

10.5.6.3.1.3 Decant the hexane into a 250 mL separatory funnel, making sure that no acid is transferred. Complete the quantitative transfer with several hexane rinses.

10.5.6.3.1.4 Back extract the solvent/residue with 50 mL of potassium hydroxide solution per Section 10.2.6, followed by two reagent water rinses.

10.5.6.3.1.5 Drain the extract through a filter funnel containing approximately 10 g of granular anhydrous sodium sulfate in a glass fiber filter into a K-D concentrator.

10.5.6.3.1.6 Concentrate the cleaned up extract to a volume suitable for the additional cleanups given in Sections 10.5.1 through 10.5.6. GPC, alumina, and Carbopak/Celite are recommended as minimum additional cleanup steps.

10.5.6.3.1.7 Following cleanup, concentrate the extract to 10 uL as described in Section 10.4, and proceed with analysis per Section 10.6.

10.5.7 Florisil Cleanup

10.5.7.1 Procedure for Florisil Cleanup

10.5.7.1.1 Pre-elute the activated Florisil column (see Section 7.5.5) with 10 mL of methylene chloride, followed by 10 mL of hexane:methylene chloride (98:2 v/v), and discard the solvents.

10.5.7.1.2 When the solvent is within 1 mm of the packing, apply the sample extract (in hexane) to the column. Rinse the sample container twice with 1 mL portions of hexane and apply to the column.

10.5.7.1.3 Elute the interfering compounds with 20 mL of hexane:methylene chloride (98:2) and discard the eluate.

10.5.7.1.4 Elute the CDDs/CDFs with 35 mL of methylene chloride and collect the eluate. Concentrate the eluate per Section 10.3 for further cleanup or for injection into the HPLC or Gas Chromatograph/Mass Spectrometer (GC/MS).

10.6 Sample Analyses by High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS)

10.6.1 Sample extracts shall be analyzed only after the HRGC/HRMS system has met the WDM, isomer specificity check, HRGC/HRMS system performance check, initial calibration,

and calibration verification requirements. The same instrument conditions must be employed for the analysis of samples as were used for calibration.

10.6.2 Establish the operating conditions given in Section 9.1.

10.6.3 Add 10 µL of the appropriate internal standard solution to the sample extract for a maximum final volume of 20 µL immediately prior to injection to minimize the possibility of loss by evaporation, adsorption, or reaction. If an extract is to be re-analyzed and evaporation has occurred, do not add more instrument recovery standard solution. Rather, bring the extract back to its previous volume (e.g., 19 µL) with pure nonane or isooctane only (18 µL if 2 µL injections are used).

10.6.4 Inject 1 or 2 µL of the concentrated extract containing the internal standard solution using on-column or splitless injection. The volume injected must be identical to the volume used for calibration (see Section 9). Start the GC column initial isothermal hold upon injection. Start HRMS data collection after the solvent peak elutes. Stop data collection after the octachlorinated dibenzo-p-dioxin (OCDD) and octachlorinated dibenzofuran (OCDF) have eluted.

10.6.5 Analysis of Complex Samples

Some samples may contain high levels (> 10 ng/L or > 1000 ng/kg) of the compounds of interest, interfering compounds, and/or polymeric materials. Some extracts will not concentrate to 10 µL (see Section 10.4.8); others may overload the HRGC column and/or MS. Analyze a smaller aliquot of the sample (see Section 10.6.6) when the extract will not concentrate to 20 µL after all cleanup procedures have been exhausted.

10.6.6 Sample Dilution

If the SICP area at either quantitation m/z for any of the 2,3,7,8-substituted PCDD/PCDF given in Table 1 of Exhibit C (except OCDD and OCDF) exceeds the calibration range of the system, the Contractor shall do the following:

1. Add sufficient Internal Standard to the original sample extract such that its concentration upon dilution is equal to the concentration of the Internal Standard in the original sample extract. Dilute the respiked sample extract in order to bring the high concentration compound(s) within calibration range. Do not exceed a 20x dilution. This reanalysis in not billable.

2. Contact the TOPO if the sample extract will require a greater than 20x dilution.

10.6.7 Results are reported to three significant figures, as appropriate for the CDDs/CDFs and labeled compounds found in all standards, blanks, QC samples, and samples.

10.6.7.1 For aqueous samples, report results in pg/L (parts-per-quadrillion).

10.6.7.2 For samples containing greater than one percent solids (soils, sediments, filter cake, compost) report results in ng/kg based on the dry weight of the sample. Report the Percent Solids so that the result may be corrected.

10.6.7.3 For tissues, report results in ng/kg of wet tissue, not on the basis of the lipid content of the sample. Report the Percent Lipids content so that the data user can calculate the concentration on a lipid basis, if desired.

10.6.7.4 Samples — Report results for all peaks with S/N above 2.5, even if below the CRQL (See Exhibit C).

11.0 DATA ANALYSIS AND CALCULATIONS

11.1 Qualitative Identification

11.1.1 Identification of Target Analytes

A chlorinated dibenzo-p-dioxin (CDD) and chlorinated dibenzofuran (CDF) (native or labeled) is identified when all of the criteria in Sections 11.1.1.1 through 11.1.1.4 are met.

11.1.1.1 The signals for the two exact mass-to-charge ratios (m/z's) must be present and must maximize within the same 2 seconds.

11.1.1.2 The signal-to-noise ratio (S/N) at each exact m/z must be greater than or equal to 2.5 for a sample extract, and greater than or equal to 10 for a calibration standard.

11.1.1.3 The ratio of the integrated areas of the two exact m/z's specified in Table 8 must be within the limits in Table 9, or within ± 10% of the ratio in the most recent Midpoint Calibration Standard (CS3).

11.1.1.4 The Relative Retention Time (RRT) of the peak representing a native 2,3,7,8-substituted CDD or CDF must be within the limit in Table 2. The Retention Time (RT) of peaks representing non-2,3,7,8-substituted CDDs/CDFs must be within the RTs established during the analysis of the Window Defining Mix (WDM) for the first and last eluting compounds.

11.1.2 High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) Confirmatory Analysis of CDDs/CDFs

Isomer specificity of 2,3,7,8-tetrachlorodibenzofuran (TCDF) cannot be achieved on the DB-5 (or equivalent) HRGC column. Therefore, any sample in which 2,3,7,8-TCDF is positively identified at or above the Contract Required Quantitation Limit (CRQL) by analysis on a DB-5 (or equivalent) HRGC column, or TCDF is reported as an Estimated Maximum Possible Concentration (EMPC) at or above the CRQL, must have a confirmatory analysis performed on a DB-225 or equivalent HRGC column. The operating conditions in Section 9.1 may be adjusted for analysis on the second HRGC column, but the HRGC/HRMS must meet the mass resolution and calibration specifications in Section 9. Confirmation analysis must meet the criteria given in Section 11.3.

NOTE: The confirmatory analysis is not required when the contractor chooses to use a column which meets isomer specificity requirements for both 2,3,7,8-TCDD and 2,3,7,8-TCDF. The column must meet all criteria established in Section 9.

11.2 Quantitative Determination

The relative ion abundance ratio criteria for native analytes and labeled standards must be met using peak areas to calculate ratios. If the ion abundance ratios are not met because of coeluting interferences, but all other criteria are met, the contractor can use peak heights to evaluate the ion ratio. If, in the judgement of the analyst, the peak is a CDD/CDF, report the ion abundance ratios determined using peak heights, quantitate the peaks using peak heights instead of areas (for both the native and labeled analytes), and flag the data on Form I-HR.

11.2.1 Isotope Dilution Method

11.2.1.1 By adding a known amount of labeled compounds to every sample prior to extraction, correction for recovery of the native compound can be made because the native compound and its labeled analog exhibit similar effects upon extraction, concentration, and Gas Chromatography (GC).

11.2.1.2 Because of a potential interference, the labeled analog of the isomer octachlorinated dibenzofuran (OCDF) is not added to the sample. Therefore, native OCDF is quantitated against labeled octachlorinated dibenzo-p-dioxin (OCDD). As a result, the concentration of native OCDF is corrected for the recovery of the OCDD. In instances where OCDD and OCDF behave differently during sample extraction, concentration, and cleanup procedures, this may decrease the accuracy of the OCDF results. However, given the low toxicity of this compound relative to the other dioxins and furans, the potential decrease in accuracy is not considered significant.

11.2.1.3 Because the labeled compound analog of 1,2,3,7,8,9-HxCDD is not added before extraction of the sample, it cannot be used to quantitate the native compound by strict isotope dilution procedures. Therefore, native 1,2,3,7,8,9-HxCDD is quantitated using the average of the responses of the labeled compound analogs of the other two 2,3,7,8-substituted HxCDDs: 1,2,3,4,7,8-HxCDD and 1,2,3,6,7,8-HxCDD. As a result, the concentration of native 1,2,3,7,8,9-HxCDD is corrected for the average recovery of the other two HxCDDs.

11.2.1.4 Any peaks representing non-2,3,7,8-substituted CDDs/CDFs are quantitated using an average of the response factors from all of the labeled standard 2,3,7,8-isomers at the same level of chlorination.

11.2.1.5 The mean Relative Response (RR) values from the initial calibration data described in Section 9.3.4.3 are used to determine concentrations directly, so long as labeled compound spiking levels are constant, using the following equation:

EQ. 10

$$C_{EX}\ (ng/mL) = \frac{(A1_N + A2_N)\ C_L}{(A1_L + A2_L)\ \overline{RR}}$$

Where:

C_{EX} = The concentration of the native compound in the extract.

C_L = The concentration of the labeled compound in the extract.

$\overline{RR}$ is defined in Section 9.3.4.3. The other terms are as defined in Section 9.3.4.1

11.2.2 Internal Standard Method

11.2.2.1 Compute the concentrations of the ^{13}C-labeled analogs and the ^{37}Cl-labeled cleanup standard in the extract using the mean Relative Response Factors (RRFs) determined from the initial calibration data (see Section 9.3.4.4) and the following equation:

EQ. 11

$$C_{EX}\ (ng/mL) = \frac{(A1_S + A2_S)\ C_{IS}}{(A1_{IS} + A2_{IS})\ \overline{RRF}}$$

Where:

C_{EX} = The concentration of the labeled compound in the extract.

C_L = The concentration of the labeled compound in the extract.

$\overline{RRF}$ is defined in Section 9.3.4.4. The other terms are as defined in Section 9.3.4.2.

11.2.2.1.1 There is only one m/z for the ^{37}Cl-labeled cleanup standard.

11.2.3 The concentration of a native compound in a soil/sediment or tissue sample is computed using the concentration of the compound in the extract and the weight of the sample (see Section 10.1.4.1), using the following equation:

EQ. 12

$$\textbf{Concentration in Solid (ng/kg)} = \frac{(C_{EX} \times V_{EX})}{W_S}$$

Where:

C_{EX} = The concentration of the native compound in the extract.

V_{EX} = The extract volume in mL.

W_S = The sample weight (dry weight) in kg.

11.2.4 The concentration of a native compound in a water matrix sample is computed using the concentration of the compound in the extract and the volume of water extracted (see Section 10.1.3), using the following equation:

EQ. 13

$$\textbf{Concentration in Water Phase (pg/L)} = \frac{(C_{EX} \times V_{EX})}{V_S} \times 1000$$

Where:

C_{EX} = The concentration of the native compound in the extract.

V_{EX} = The extract volume in mL.

V_S = The sample volume in liters.

11.2.5 Sample-Specific Estimated Detection Limit (EDL)

The EDL is the concentration of a given analyte required to produce a signal with a peak height of at least 2.5 times the background signal level. An EDL is calculated for each CDD/CDF that is not identified, regardless of whether or not other non-2,3,7,8-substituted CDD/CDFs are present.

11.2.5.1 Use the expression for EDL below to calculate an EDL for each absent CDD/CDF (i.e., S/N < 2.5). The background level is determined by measuring the range of the noise (peak-to-peak) for the two quantitation ions (see Table 8) of a particular CDD/CDF, in the region of the Selected Ion Current Profile (SICP) trace corresponding to the elution of the labeled compound or in the region of the SICP where the congener is expected to elute by comparison with the routine calibration data (for those congeners that do not have a ^{13}C-labeled compound), multiplying that noise height by 2.5, and relating the product to an estimated concentration that would produce that peak height. Use the following formula for aqueous samples:

EQ. 14

$$\textbf{Aqueous EDL (pg/L)} = \frac{2.5 \times Q_{IS} \times (H_{x1} + H_{x2}) \times D}{V \times (H_{IS1} + H_{IS2}) \times \overline{RR}}$$

Use the following formula for soil samples:

EQ. 15

$$\textbf{Soil EDL (ng/Kg)} = \frac{2.5 \times Q_{IS} \times (H_{x1} + H_{x2}) \times D}{W \times (H_{IS1} + H_{IS2}) \times \overline{RR}}$$

Where:

EDL = Estimated Detection Limit for 2,3,7,8-substituted CDDs/CDFs.

Q_{IS} = Quantity (pg) of appropriate internal standard added prior to sample extraction.

H_{x1}, H_{x2} = Peak heights of the noise for both quantitation ions of the CDD/CDF.

H_{IS1}, H_{IS2} = Peak heights of the internal standard ions.

D = Dilution Factor.

V = Volume extracted in liters.

W = Weight extracted in grams.

$\overline{RR}$ = The mean Relative Response for the isomer of interest from the initial calibration (See Section 9.3.4.3).

NOTE: If interferences can be shown to be present (e.g., PCBs), then descriptor ions other than those listed in Table 8 may be used for quantitation. This deviation shall be adequately documented in the Case Narrative.

11.2.6 Estimated Maximum Possible Concentration (EMPC)

An EMPC is calculated for 2,3,7,8-substituted isomers that are characterized by a response with an S/N of at least 2.5 for both quantitation ions, but that do not meet all the identification criteria described in Section 11.

11.2.6.1 The EMPC of a native compound in a soil/sediment or tissue samples is computed using the concentration of the compound in the extract and the dilution factor (see Section 10.6.6), as follows:

EQ. 16

$$\text{EMPC (ng/Kg)} = \frac{(C_{EX} \times D)}{W_S}$$

Where:

D = Dilution Factor.

W_S = Sample weight (dry weight) in Kg.

11.2.6.2 The concentration of a native compound in a water matrix sample is computed using the concentration of the compound in the extract and the dilution factor (see Section 10.6.6), as follows:

EQ. 17

$$\text{EMPC (pg/L)} = \frac{(C_{EX} \times D)}{V_S}$$

Where:

D = Dilution Factor.

V_S = Sample volume in liters.

C_{EX} = The concentration of the native compound in the extract.

11.2.7 Percent Recovery (%R) of Labeled Compounds and Cleanup Standard

11.2.7.1 Compute the Percent Recovery of the labeled compounds and cleanup standard using the internal standard method and the following equation.

EQ. 18

$$\% R = \frac{\textbf{Measured Concentration}}{\textbf{Known Concentration}} \times 100$$

11.2.7.2 The $^{13}C_{12}$-1,2,3,4-TCDD internal standard is used to quantitate the tetra and penta labeled compounds and the cleanup standard. The $^{13}C_{12}$-1,2,3,7,8,9-HxCDD internal standard is used to quantitate the HxCDD-, HpCDF-, and OCDD-labeled compounds.

11.3 Technical Acceptance Criteria for Sample Analysis

11.3.1 The samples must be analyzed on a HRGC/HRMS system meeting the WDM, isomer specificity check, PFK, initial calibration, calibration verification, and blank technical acceptance criteria. The sample must undergo cleanup procedures, when required.

11.3.2 The samples must be extracted and analyzed within the contract holding times.

11.3.3 The samples must have an associated method blank meeting the blank technical acceptance criteria.

11.3.4 The samples must meet the qualitative identification criteria in Table 9.

11.3.5 The labeled compounds of the sample must meet the acceptance criteria in Table 7.

11.3.6 If any target analyte concentration exceeds the upper limit of the initial calibration, see Section 10.6.6.

11.4 Corrective Action for Sample Analysis

11.4.1 Sample analysis technical acceptance criteria MUST be met before data are reported. Samples contaminated from laboratory sources or associated with a contaminated method blank (refer to Section 12.1.4.2) will require re-extraction and re-analysis at no additional cost to USEPA. Any samples analyzed that do not meet the technical acceptance criteria will require re-extraction and/or re-analysis at no additional cost to USEPA.

11.4.2 If the sample analysis technical acceptance criteria are not met, check calculations, internal standard solution, and system performance. It may be necessary to recalibrate the system or take other corrective action procedures to meet the technical acceptance criteria, in which case, the affected samples must be re-analyzed at no additional cost to USEPA after the corrective action.

11.4.3 System performance checks, initial calibration, and calibration verification must be acceptable before the re-analysis of samples.

12.0 QUALITY CONTROL (QC)

12.1 Method Blank

12.1.1 Summary of Method Blanks

A method blank is a volume of a clean reference matrix that is carried through the entire analytical procedure. The volume of the reference matrix must be approximately equal to the volume or weight of samples associated with the blank. The purpose of the method blank is to determine the level of contamination associated with the processing and analysis of samples.

12.1.2 Frequency of Method Blank Analyses

A method blank must be extracted each time samples are extracted. The number of samples extracted with each method blank shall not exceed 20 field samples (excluding Laboratory Control Samples [LCSs] and Performance Evalution [PE] samples). In addition, a method blank shall be extracted and cleaned up by the same procedures used to extract and clean up samples and shall be analyzed on each High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) system used to analyze associated samples.

12.1.3 Procedure for Method Blank Preparation

Extract, concentrate, cleanup, and analyze the blank according to the procedure for water, soil/sediment, and tissue samples. Analyze the method blank prior to analysis of samples from the same Sample Delivery Group (SDG).

12.1.4 Technical Acceptance Criteria for Method Blank Analyses

12.1.4.1 Acceptable method blanks must not contain any chemical interference or electronic noise at or above the Contract Required Quantitation Limit (CRQL) at the mass-to-charge ratio (m/z) of the native compounds.

12.1.4.2 For all chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) (except octachlorinated dibenzo-p-dioxin/octachlorinated dibenzofuran [OCDD/OCDF]), the concentration of the native compounds in the method blank must be less than or equal to the CRQL. The concentration of OCDD/OCDF in the method blank must be less than three times the CRQL.

12.1.4.3 The method blank must meet the technical acceptance criteria for sample analyses.

12.1.5 Corrective Action for Method Blank Analyses

12.1.5.1 If a method blank does not meet the technical acceptance criteria for method blank analysis, the Contractor must consider the analytical system to be out-of-control. Samples with native compound concentrations above the CRQLs and associated with a contaminated blank must be re-extracted and re-analyzed at no additional cost to USEPA.

12.1.5.2 If contamination is the problem, the source of the contamination must be investigated and appropriate corrective measures must be taken and documented before further sample analysis proceeds. It is the Contractor's responsibility to ensure that method interferences caused by contaminants in the solvent, reagents, glassware, and sample storage and processing hardware that lead to discrete artifacts and/or elevated baseline in the HRGC/HRMS are eliminated. Samples associated with a contaminated blank must be re-extracted and re-analyzed at no additional cost to USEPA.

12.2 Laboratory Control Sample (LCS)

12.2.1 Summary of LCS

The LCS is a volume of clean reference matrix that is spiked and carried through the entire analytical procedure. To evaluate the accuracy of the method used for CDD/CDF analyses, USEPA has prescribed a mixture of CDD/CDF target compounds to be spiked into an aliquot of reference matrix and analyzed in accordance with the appropriate method.

12.2.2 Frequency of LCS Analysis

A LCS must be extracted and analyzed for every 20 field samples of a similar matrix in an SDG, whenever samples are extracted by the same procedure.

12.2.3 Procedure for Preparing LCS

12.2.3.1 Prepare an aliquot of clean reference matrix. Spike the aliquot with 1.0 mL of the labeled compound spiking solution (see Section 7.7.4.2) and 1.0 mL of the LCS spiking solution (see Section 7.8.4).

12.2.3.2 Extract, concentrate, cleanup, and analyze the LCS according to the procedure for water, soil/sediment, and tissue samples. Analyze the LCS prior to analysis of samples from the same SDG.

12.2.4 Calculation for LCS

12.2.4.1 Calculate the concentration of each analyte according to the procedure for calculations (see Section 11).

12.2.4.2 Compute the Percent Recovery of the LCS analytes using the following equation:

EQ. 19

$$\text{\% LCS Recovery} = \frac{\text{Spike Sample Result}}{\text{Spike Added}} \times 100$$

12.2.5 Technical Acceptance Criteria for LCS

12.2.5.1 All LCS must be prepared and analyzed at the frequency described.

12.2.5.2 The LCS must meet the technical acceptance criteria for sample analyses in Section 11.3.

12.2.5.3 The Percent Recovery of each of the compounds in the LCS must be within the acceptance limits in Table 6. Up to three compounds may fail to meet the recovery limits listed in Table 6. However, frequent failures to meet the limits for recovery warrant investigation by the laboratory, and may result in questions from USEPA.

12.2.6 Corrective Action for LCS

If an LCS does not meet the technical acceptance criteria for LCS Percent Recovery, the Contractor must consider the analytical system to be out-of-control. Samples associated with a non-compliant LCS must be re-extracted and re-analyzed at no additional cost to USEPA.

13.0 POLLUTION PREVENTION

13.1 The solvents used in this method pose little threat to the environment when managed properly.

13.2 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14.0 WASTE MANAGEMENT

14.1 It is the laboratory's responsibility to comply with all Federal, state, and local regulations governing waste management, particularly the hazardous waste identification rules and land disposal restrictions, and to protect the air, water, and land by minimizing and controlling all releases from fume hoods and bench operations. Also, compliance is required with any sewage discharge permits and regulations.

14.2 Samples containing HCl to pH <2 are hazardous and must be neutralized before being poured down a drain or handled as hazardous waste.

14.3 The chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) decompose above 800°C. Low level waste such as absorbent paper, tissues, animal remains, and plastic gloves may be burned in an appropriate incinerator. Gross quantities (milligrams) should be packaged securely and disposed through commercial or governmental channels that are capable of handling extremely toxic wastes.

14.4 Liquid or soluble waste should be dissolved in methanol or ethanol and irradiated with ultraviolet light with a wavelength shorter than 290 nm for several days. (Use F40 BL lamps or equivalent.) Analyze liquid wastes and dispose of the solutions when the

CDDs/CDFs can no longer be detected.

14.5 For further information on waste management, consult "The Waste Management Manual for Laboratory Personnel" and "Less is Better — Laboratory Chemical Management for Waste Reduction", available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th Street N.W., Washington, D.C. 20036.

15.0 TABLES/DIAGRAMS/FLOWCHARTS

Table 1. Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) Determined by Isotope Dilution and Internal Standard High Resolution Gas Chromatography /High Resolution Mass Spectrometry (HRGC/HRMS)

CDDs/CDFs [1]	CAS Registry	Labeled analog	CAS Registry
2,3,7,8-TCDD	1746-01-6	$^{13}C_{12}$-2,3,7,8-TCDD $^{37}Cl_4$-2,3,7,8-TCDD	76523-40-5 85508-50-5
Total TCDD	41903-57-5	—	—
2,3,7,8-TCDF	51207-31-9	$^{13}C_{12}$-2,3,7,8-TCDF	89059-46-1
Total-TCDF	55722-27-5	—	—
1,2,3,7,8-PeCDD	40321-76-4	$^{13}C_{12}$-1,2,3,7,8-PeCDD	109719-79-1
Total-PeCDD	36088-22-9	—	—
1,2,3,7,8-PeCDF	57117-41-6	$^{13}C_{12}$-1,2,3,7,8-PeCDF	109719-77-9
2,3,4,7,8-PeCDF	57117-31-4	$^{13}C_{12}$-2,3,4,7,8-PeCDF	116843-02-8
Total-PeCDF	30402-15-4	—	—
1,2,3,4,7,8-HxCDD	39227-28-6	$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	109719-80-4
1,2,3,6,7,8-HxCDD	57653-85-7	$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	109719-81-5
1,2,3,7,8,9-HxCDD	19408-74-3	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	109719-82-6
Total-HxCDD	34465-46-8	—	—
1,2,3,4,7,8-HxCDF	70648-26-9	$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	114423-98-2
1,2,3,6,7,8-HxCDF	57117-44-9	$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	116843-03-9
1,2,3,7,8,9-HxCDF	72918-21-9	$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	116843-04-0
2,3,4,6,7,8-HxCDF	60851-34-5	$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	116843-05-1
Total-HxCDF	55684-94-1	—	—
1,2,3,4,6,7,8-HpCDD	35822-46-9	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	109719-83-7
Total-HpCDD	37871-00-4	—	—
1,2,3,4,6,7,8-HpCDF	67562-39-4	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	109719-84-8
1,2,3,4,7,8,9-HpCDF	55673-89-7	$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	109719-94-0
Total-HpCDF	38998-75-3	—	—
OCDD	3268-87-9	$^{13}C_{12}$-OCDD	114423-97-1
OCDF	39001-02-0	not used	—

[1] Chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans

TCDD = Tetrachlorodibenzo-p-dioxin
TCDF = Tetrachlorodibenzofuran
PeCDD = Pentachlorodibenzo-p-dioxin
PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-p-dioxin
HxCDF = Hexachlorodibenzofuran
HpCDD = Heptachlorodibenzo-p-dioxin
HpCDF = Heptachlorodibenzofuran
OCDD = Octachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzofuran

TABLE 2. Retention Time (RT) References, Quantitation References, Relative Retention Times (RRTs), and Minimum Levels for Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs)

CDD/CDF	Retention Time and Quantitation Reference	Relative Retention Time	CRQL		
			Water (pg/L; ppq)	Solid (ng/kg; ppt)	Extract (pg/µL;
Compounds using $^{13}C_{12}$-1,2,3,4-TCDD as the injection internal standard					
2,3,7,8-TCDF	$^{13}C_{12}$-2,3,7,8-TCDF	0.999–1.003	10	1	0.5
2,3,7,8-TCDD	$^{13}C_{12}$-2,3,7,8-TCDD	0.999–1.002	10	1	0.5
1,2,3,7,8-PeCDF	$^{13}C_{12}$-1,2,3,7,8-PeCDF	0.999–1.002	50	5	2.5
2,3,4,7,8-PeCDF	$^{13}C_{12}$-2,3,4,7,8-PeCDF	0.999–1.002	50	5	2.5
1,2,3,7,8-PeCDD	$^{13}C_{12}$-1,2,3,7,8-PeCDD	0.999–1.002	50	5	2.5
$^{13}C_{12}$-2,3,7,8-TCDF	$^{13}C_{12}$-1,2,3,4-TCDD	0.923–1.103			
$^{13}C_{12}$-2,3,7,8-TCDD	$^{13}C_{12}$-1,2,3,4-TCDD	0.976–1.043			
$^{37}Cl_4$-2,3,7,8-TCDD	$^{13}C_{12}$-1,2,3,4-TCDD	0.989–1.052			
$^{13}C_{12}$-1,2,3,7,8-PeCDF	$^{13}C_{12}$-1,2,3,4-TCDD	1.000–1.425			
$^{13}C_{12}$-2,3,4,7,8-PeCDF	$^{13}C_{12}$-1,2,3,4-TCDD	1.011–1.526			
$^{13}C_{12}$-1,2,3,7,8-PeCDD	$^{13}C_{12}$-1,2,3,4-TCDD	1.000–1.567			
Compounds using $^{13}C_{12}$-1,2,3,7,8,9-HxCDD as the injection internal standard					
1,2,3,4,7,8-HxCDF	$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	0.999–1.001	50	5	2.5
1,2,3,6,7,8-HxCDF	$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	0.997–1.005	50	5	2.5
1,2,3,7,8,9-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	0.999–1.001	50	5	2.5
2,3,4,6,7,8-HxCDF	$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	0.999–1.001	50	5	2.5
1,2,3,4,7,8-HxCDD	$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	0.999–1.001	50	5	2.5
1,2,3,6,7,8-HxCDD	$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	0.998–1.004	50	5	2.5
1,2,3,7,8,9-HxCDD[1]		1.000–1.019	50	5	2.5
1,2,3,4,6,7,8-HpCDF	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	0.999–1.001	50	5	2.5
1,2,3,4,7,8,9-HpCDF	$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	0.999–1.001	50	5	2.5
1,2,3,4,6,7,8-HpCDD	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	0.999–1.001	50	5	2.5
OCDF	$^{13}C_{12}$-OCDD	0.999–1.008	100	10	5.0
OCDD	$^{13}C_{12}$-OCDD	0.999–1.001	100	10	5.0
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.944–0.970			
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.949–0.975			
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.977–1.047			
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.959–1.021			
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.977–1.000			
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.981–1.003			
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.043–1.085			
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.057–1.151			
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.086–1.110			
$^{13}C_{12}$-OCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.032–1.311			

[1]The retention time reference for 1,2,3,7,8,9-HxCDD is $^{13}C_{12}$-1,2,3,6,7,8-HxCDD. 1,2,3,7,8,9-HxCDD is quantified using the averaged responses of $^{13}C_{12}$-1,2,3,4,7,8-HxCDD and $^{13}C_{12}$-1,2,3,6,7,8-HxCDD.

TABLE 3. Concentration of Stock and Spiking Solutions Containing Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) and Labeled Compounds

CDD/CDF	Labeled compound stock solution[1] (ng/mL)	Labeled compound spiking solution[2] (ng/mL)	Native compound stock solution[3] (ng/mL)	Native compound spiking solution[4] (ng/mL)
2,3,7,8-TCDD	—	—	40	0.2
2,3,7,8-TCDF	—	—	40	0.2
1,2,3,7,8-PeCDD	—	—	200	1
1,2,3,7,8-PeCDF	—	—	200	1
2,3,4,7,8-PeCDF	—	—	200	1
1,2,3,4,7,8-HxCDD	—	—	200	1
1,2,3,6,7,8-HxCDD	—	—	200	1
1,2,3,7,8,9-HxCDD	—	—	200	1
1,2,3,4,7,8-HxCDF	—	—	200	1
1,2,3,6,7,8-HxCDF	—	—	200	1
1,2,3,7,8,9-HxCDF	—	—	200	1
2,3,4,6,7,8-HxCDF	—	—	200	1
1,2,3,4,6,7,8-HpCDD	—	—	200	1
1,2,3,4,6,7,8-HpCDF	—	—	200	1
1,2,3,4,7,8,9-HpCDF	—	—	200	1
OCDD	—	—	400	2
OCDF	—	—	400	2
$^{13}C_{12}$-2,3,7,8-TCDD	100	2	—	—
$^{13}C_{12}$-2,3,7,8-TCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	2	—	—
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	2	—	—
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100	2	—	—
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	2	—	—
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	100	2	—	—
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	2	—	—
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	2	—	—
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	100	2	—	—
$^{13}C_{12}$-OCDD	200	4	—	—

TABLE 3. Concentration of Stock and Spiking Solutions Containing Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) and Labeled Compounds

CDD/CDF	Labeled compound stock solution[1] (ng/mL)	Labeled compound spiking solution[2] (ng/mL)	Native compound stock solution[3] (ng/mL)	Native compound spiking solution[4] (ng/mL)
Cleanup Standard[5]				
$^{37}Cl_4$-2,3,7,8-TCDD	0.8			
Internal Standards[6]				
$^{13}C_{12}$-1,2,3,4-TCDD	200			
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	200			

[1]Section 7.7.2, prepared in nonane and diluted to prepare spiking solution.

[2]Section 7.7.4, prepared in acetone from stock solution daily.

[3]Section 7.7.3, prepared in nonane and diluted to prepare spiking solution.

[4]Section 7.8.4, prepared in acetone from stock solution daily.

[5]Section 7.8.1, prepared in nonane and added to extract prior to cleanup.

[6]Section 7.8.2, prepared in nonane and added to the concentrated extract immediately prior to injection into the GC (see Section 10.6.3).

TABLE 4. Concentration of Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) in Calibration and Calibration Verification Solutions

CDD/CDF	CS1 (ng/mL)	CS2 (ng/mL)	CS3[1] (ng/mL)	CS4 (ng/mL)	CS5 (ng/mL)
2,3,7,8-TCDD	0.5	2	10	40	200
2,3,7,8-TCDF	0.5	2	10	40	200
1,2,3,7,8-PeCDD	2.5	10	50	200	1000
1,2,3,7,8-PeCDF	2.5	10	50	200	1000
2,3,4,7,8-PeCDF	2.5	10	50	200	1000
1,2,3,4,7,8-HxCDD	2.5	10	50	200	1000
1,2,3,6,7,8-HxCDD	2.5	10	50	200	1000
1,2,3,7,8,9-HxCDD	2.5	10	50	200	1000
1,2,3,4,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,6,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,7,8,9-HxCDF	2.5	10	50	200	1000
2,3,4,6,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,4,6,7,8-HpCDD	2.5	10	50	200	1000
1,2,3,4,6,7,8-HpCDF	2.5	10	50	200	1000
1,2,3,4,7,8,9-HpCDF	2.5	10	50	200	1000
OCDD	5.0	20	100	400	2000
OCDF	5.0	20	100	400	2000
$^{13}C_{12}$-2,3,7,8-TCDD	100	100	100	100	100
$^{13}C_{12}$-2,3,7,8-TCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	100	100	100	100
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	100	100	100	100
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	100	100	100	100	100
$^{13}C_{12}$-OCDD	200	200	200	200	200
Cleanup Standard					
$^{37}Cl_4$-2,3,7,8-TCDD	0.5	2	10	40	200
Internal Standards					
$^{13}C_{12}$-1,2,3,4-TCDD	100	100	100	100	100
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	100	100	100	100	100

[1]See Section 7.8.3, calibration verification solution.

Table 5. Gas Chromatography (GC) Retention Time (RT) Window Defining Mixture (WDM) and Isomer Specificity Check Standard (see Section 7.8.5)

CDD/CDF	First Eluted	Last Eluted
TCDF	1,3,6,8-	1,2,8,9-
TCDD	1,3,6,8-	1,2,8,9-
PeCDF	1,3,4,6,8-	1,2,3,8,9-
PeCDD	1,2,4,7,9-	1,2,3,8,9-
HxCDF	1,2,3,4,6,8-	1,2,3,4,8,9-
HxCDD	1,2,4,6,7,9-	1,2,3,4,6,7-
HpCDF	1,2,3,4,6,7,8-	1,2,3,4,7,8,9-
HpCDD	1,2,3,4,6,7,9-	1,2,3,4,6,7,8-

DB-5 Column TCDD Isomer Specificity Check Standard

1,2,3,7 and 1,2,3,8-TCDD
2,3,7,8-TCDD
1,2,3,9-TCDD

DB-225 Column TCDF Isomer Specificity Check Standard

2,3,4,7-TCDF
2,3,7,8-TCDF
1,2,3,9-TCDF

Sp-2331 Column TCDD Isomer Specificity Check Standard
2,3,7,8-TCDD
1,4,7,8-TCDD
1,2,3,7-TCDD
1,2,3,8-TCDD

TABLE 6. Acceptance Criteria for Laboratory Control Sample (LCS)

CDD/CDF	Test conc (ng/mL)	LCS (% Recovery)
2,3,7,8-TCDD	10	67-158
2,3,7,8-TCDF	10	75-158
1,2,3,7,8-PeCDD	50	70-142
1,2,3,7,8-PeCDF	50	80-134
2,3,4,7,8-PeCDF	50	68-160
1,2,3,4,7,8-HxCDD	50	70-164
1,2,3,6,7,8-HxCDD	50	76-134
1,2,3,7,8,9-HxCDD	50	64-162
1,2,3,4,7,8-HxCDF	50	72-134
1,2,3,6,7,8-HxCDF	50	84-130
1,2,3,7,8,9-HxCDF	50	78-130
2,3,4,6,7,8-HxCDF	50	70-156
1,2,3,4,6,7,8-HpCDD	50	70-140
1,2,3,4,6,7,8-HpCDF	50	82-132
1,2,3,4,7,8,9-HpCDF	50	78-138
OCDD	100	78-144
OCDF	100	63-170

TABLE 7. Labeled Compound Recovery in Samples When All Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) are Tested

Compound	Test conc (ng/mL)	Labeled Compound Recovery (%)
$^{13}C_{12}$-2,3,7,8-TCDD	100	25-164
$^{13}C_{12}$-2,3,7,8-TCDF	100	24-169
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	25-181
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	24-185
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100	21-178
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100	32-141
$^{13}C_{12}$-1,2,3,6,7,8,-HxCDD	100	28-130
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100	26-152
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	26-123
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	100	29-147
$^{13}C_{12}$-2,3,4,6,7,8,-HxCDF	100	28-136
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	23-140
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	28-143
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	100	26-138
$^{13}C_{12}$-OCDD	200	17-157
$^{37}Cl_4$-2,3,7,8-TCDD	10	35-197

TABLE 8. Descriptors, Exact m/z's, m/z Types, and Elemental Compositions of the Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs)

Descriptor	Exact m/z[1]	m/z Type	Elemental Composition	Substance[2]
1	292.9825	Lock	$C_7\ F_{11}$	PFK
	303.9016	M	$C_{12}\ H_4\ {}^{35}Cl_4\ O$	TCDF
	305.8987	M+2	$C_{12}\ H_4\ {}^{35}Cl_3{}^{37}Cl\ O$	TCDF
	315.9419	M	${}^{13}C_{12}\ H_4\ {}^{35}Cl_4\ O$	TCDF[3]
	317.9389	M+2	${}^{13}C_{12}\ H_4\ {}^{35}Cl_3\ {}^{37}Cl\ O$	TCDF[3]
	319.8965	M	$C_{12}\ H_4\ {}^{35}Cl_4\ O_2$	TCDD
	321.8936	M+2	$C_{12}\ H_4\ {}^{35}Cl_3\ {}^{37}Cl\ O_2$	TCDD
	327.8847	M	$C_{12}\ H_4\ {}^{37}Cl_4\ O_2$	TCDD[4]
	330.9792	QC	$C_7\ F_{13}$	PFK
	331.9368	M	${}^{13}C_{12}\ H_4\ {}^{35}Cl_4\ O_2$	TCDD[3]
	333.9339	M+2	${}^{13}C_{12}\ H_4\ {}^{35}Cl_3\ {}^{37}Cl\ O_2$	TCDD[3]
	375.8364	M+2	$C_{12}\ H_4\ {}^{35}Cl_5\ {}^{37}Cl\ O$	HxCDPE
2	339.8597	M+2	$C_{12}\ H_3\ {}^{35}Cl_4\ {}^{37}Cl\ O$	PeCDF
	341.8567	M+4	$C_{12}\ H_3\ {}^{35}Cl_3\ {}^{37}Cl_2\ O$	PeCDF
	351.9000	M+2	${}^{13}C_{12}\ H_3\ {}^{35}Cl_4\ {}^{37}Cl\ O$	PeCDF
	353.8970	M+4	${}^{13}C_{12}\ H_3\ {}^{35}Cl_3\ {}^{37}Cl_2\ O$	PeCDF[3]
	354.9792	Lock	$C_9\ F_{13}$	PFK
	355.8546	M+2	$C_{12}\ H_3\ {}^{35}Cl_4\ {}^{37}Cl\ O_2$	PeCDD
	357.8516	M+4	$C_{12}\ H_3\ {}^{35}Cl_3\ {}^{37}Cl_2\ O_2$	PeCDD
	367.8949	M+2	${}^{13}C_{12}\ H_3\ {}^{35}Cl_4\ {}^{37}Cl\ O_2$	PeCDD[3]
	369.8919	M+4	${}^{13}C_{12}\ H_3\ {}^{35}Cl_3\ {}^{37}Cl_2\ O_2$	PeCDD[3]
	409.7974	M+2	$C_{12}\ H_3\ {}^{35}Cl_6\ {}^{37}Cl\ O$	HpCDPE
3	373.8208	M+2	$C_{12}\ H_2\ {}^{35}Cl_5\ {}^{37}Cl\ O$	HxCDF
	375.8178	M+4	$C_{12}\ H_2\ {}^{35}Cl_4\ {}^{37}Cl_2\ O$	HxCDF
	383.8639	M	${}^{13}C_{12}\ H_2\ {}^{35}Cl_6\ O$	HxCDF[3]
	385.8610	M+2	${}^{13}C_{12}\ H_2\ {}^{35}Cl_5\ {}^{37}Cl\ O$	HxCDF[3]
	389.8157	M+2	$C_{12}\ H_2\ {}^{35}Cl_5\ {}^{37}Cl\ O_2$	HxCDD
	391.8127	M+4	$C_{12}\ H_2\ {}^{35}Cl_4\ {}^{37}Cl_2\ O_2$	HxCDD
	392.9760	Lock	$C_9\ F_{15}$	PFK
	401.8559	M+2	${}^{13}C_{12}\ H_2\ {}^{35}Cl_5\ {}^{37}Cl\ O_2$	HxCDD[3]
	403.8529	M+4	${}^{13}C_{12}\ H_2\ {}^{35}Cl_4\ {}^{37}Cl_2\ O_2$	HxCDD[3]
	430.9729	QC	$C_9\ F_{17}$	PFK
	445.7555	M+4	$C_{12}\ H_2\ {}^{35}Cl_6\ {}^{37}Cl_2\ O$	OCDPE
4	407.7818	M+2	$C_{12}\ H\ {}^{35}Cl_6\ {}^{37}Cl\ O$	HpCDF
	409.7789	M+4	$C_{12}\ H\ {}^{35}Cl_5\ {}^{37}Cl_2\ O$	HpCDF
	417.8253	M	${}^{13}C_{12}\ H\ {}^{35}Cl_7\ O$	HpCDF[3]
	419.8220	M+2	${}^{13}C_{12}\ H\ {}^{35}Cl_6\ {}^{37}Cl\ O$	HpCDF[3]
	423.7766	M+2	$C_{12}\ H\ {}^{35}Cl_6\ {}^{37}Cl\ O_2$	HpCDD
	425.7737	M+4	$C_{12}\ H\ {}^{35}Cl_5\ {}^{37}Cl_2\ O_2$	HpCDD
	430.9729	Lock	$C_9\ F_{17}$	PFK
	435.8169	M+2	${}^{13}C_{12}\ H\ {}^{35}Cl_6\ {}^{37}Cl\ O_2$	HpCDD[3]

TABLE 8. Descriptors, Exact m/z's, m/z Types, and Elemental Compositions of the Chlorinated Dibenzo-P-Dioxins/Chlorinated Dibenzofurans (CDDs/CDFs) (Con't)

Descriptor	Exact m/z[1]	m/z Type	Elemental Composition	Substance[2]
	437.8140	M+4	$^{13}C_{12}$ H $^{35}Cl_5$ $^{37}Cl_2$ O_2	HpCDD[3]
	479.7165	M+4	C_{12} H $^{35}Cl_7$ $^{37}Cl_2$ O	NCDPE
5	441.7428	M+2	C_{12} $^{35}Cl_7$ ^{37}Cl O	OCDF
	442.9728	Lock	C_{10} F_{17}	PFK
	443.7399	M+4	C_{12} $^{35}Cl_6$ $^{37}Cl_2$ O	OCDF
	457.7377	M+2	C_{12} $^{35}Cl_7$ ^{37}Cl O_2	OCDD
	459.7348	M+4	C_{12} $^{35}Cl_6$ $^{37}Cl_2$ O_2	OCDD
	469.7779	M+2	$^{13}C_{12}$ $^{35}Cl_7$ ^{37}Cl O_2	OCDD[3]
	471.7750	M+4	$^{13}C_{12}$ $^{35}Cl_6$ $^{37}Cl_2$ O_2	OCDD[3]
	513.6775	M+4	C_{12} $^{35}Cl_8$ $^{37}Cl_2$ O	DCDPE

[1]Nuclidic masses used:

H = 1.007825 C = 12.00000 ^{13}C = 13.003355 F = 18.9984
O = 15.994915 ^{35}Cl = 34.968853 ^{37}Cl = 36.965903

[2]TCDD =
Tetrachlorodibenzo-p-dioxin
TCDF =
Tetrachlorodibenzofuran
PeCDD =
Pentachlorodibenzo-p-dioxin
PeCDF =
Pentachlorodibenzofuran
HxCDD =
Hexachlorodibenzo-p-dioxin
HxCDF =
Hexachlorodibenzofuran
HpCDD =
Heptachlorodibenzo-p-dioxin
HpCDF =
Heptachlorodibenzofuran
OCDD =
Octachlorodibenzo-p-dioxin
OCDF =
Octachlorodibenzofuran
HxCDPE
= Hexachlorodiphenyl ether
HpCDPE
= Heptachlorodiphenyl ether
OCDPE =
Octachlorodiphenyl ether
NCDPE =
Nonachlorodiphenyl ether
DCDPE =
Decachlorodiphenyl ether
PFK =
Perfluorokerosene

[3]Labeled compound.

[4]There is only one m/z for $^{37}Cl_4$-2,3,7,8,-TCDD (cleanup standard).

TABLE 9. Theoretical Ion Abundance Ratios and Quality Control (QC) Limits

Number of Chlorine Atoms	m/z's Forming Ratio	Theoretical Ratio	QC Limit[1]	
			Lower	Upper
4[2]	M/(M+2)	0.77	0.65	0.89
5	(M+2)/(M+4)	1.55	1.32	1.78
6	(M+2)/(M+4)	1.24	1.05	1.43
6[3]	M/(M+2)	0.51	0.43	0.59
7	(M+2)/(M+4)	1.05	0.88	1.20
7[4]	M/(M+2)	0.44	0.37	0.51
8	(M+2)/(M+4)	0.89	0.76	1.02

[1]QC limits represent ±15% windows around the theoretical ion abundance ratios.

[2]Does not apply to $^{37}Cl_4$-2,3,7,8-TCDD (cleanup standard).

[3]Used for $^{13}C_{12}$-HxCDF only.

[4]Used for $^{13}C_{12}$-HpCDF only.

Table 10. Suggested Sample Quantities to be Extracted for Various Matrices[1]

Sample Matrix[2]	Example	Percent Solids	Phase	Quantity Extracted
Single-phase				
Aqueous	Drinking water	<1	[3]	1000 mL
	Groundwater			
	Treated wastewater			
Solid	Dry soil	>20	Solid	10 g
	Compost			
	Ash			
Organic	Waste Oil	<1	Organic	10 g
	Organic Polymer			
Tissue	Fish	—	Organic	10 g
Multi-phase				
Liquid/Solid				
Aqueous/Solid	Wet soil	1-30	Solid	10 g
	Untreated effluent			
	Digested municipal sludge			
Organic/solid	Industrial sludge	1-100	Both	10 g
	Oily waste			
Liquid/Liquid				
Aqueous/organic	In-process effluent	<1	Organic	10 g
	Untreated effluent			
Aqueous/organic/solid	Untreated effluent	>1	Organic & solid	10 g

[1]The quantity of sample to be extracted is adjusted to provide 10 g of solids (dry weight). 1 L of aqueous samples containing one Percent Solids will contain 10 grams of solids. For aqueous samples containing greater than one Percent Solids, a lesser volume is used so that 10 grams of solids (dry weight) will be extracted.

[2]The sample matrix may be amorphous for some samples. In general, when the chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans (CDDs/CDFs) are in contact with a multiphase system in which one of the phases is water, they will be preferentially dispersed in, or adsorbed on, the alternate phase because of their low solubility in water.

[3]Aqueous samples are filtered after spiking with the labeled compounds. The filtrate and the materials trapped on the filter are extracted separately, and the extracts are combined for cleanup and analysis.

ATTACHMENT 5

SOW- EXHIBIT E - QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES AND REQUIREMENTS

EXHIBIT E

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES AND REQUIREMENTS

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1.0 OVERVIEW

The QA process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity, and ensures that data provided are of the quality required. The QC process includes those activities required during data collection to produce the data quality desired and to document the quality of the collected data.

1.1 Quality Assurance/Quality Control (QA/QC) Activities

During the planning of an environmental data collection program, QA activities focus on defining data quality criteria and designing a QC system to measure the quality of data being generated. During the implementation of the data collection effort, QA activities ensure that the QC system is functioning effectively, and the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data obtained to determine its suitability to support enforcement or remedial decisions.

1.1.1 This exhibit describes the overall QA/QC operations and the processes by which the QA/QC objectives defined above are met. This contract requires a variety of QA/QC activities. These contract requirements are the minimum QC operations necessary to satisfy the analytical requirements associated with the determination of the different method analytes. These QC operations are designed to facilitate laboratory comparison by providing the Government with comparable data from all Contractors. These requirements do not release the analytical Contractor from maintaining their own QC checks on method and instrument performance.

2.0 INTRODUCTION

Appropriate use of data generated under the large range of analytical conditions encountered in environmental analyses requires reliance on the Quality Control (QC) procedures and criteria incorporated into the methods. Inaccuracies can also result from causes other than unanticipated matrix effects, such as sampling artifacts, equipment malfunctions, and operator error. Therefore, the QC component of each method is indispensable.

The data acquired from QC procedures are used to estimate and evaluate the information content of analytical results and to determine the necessity for, or the effect of, corrective action procedures. The parameters used to estimate information content include precision, accuracy, and other quantitative and qualitative indicators. In addition, QC procedures give an overview of the activities required in an integrated program to generate data of known and documented quality required to meet defined objectives.

2.1 Quality Assurance/Quality Control (QA/QC) Program Components

2.1.1 The necessary components of a complete QA/QC program include internal QC criteria that demonstrate acceptable levels of performance, as determined by QA review. External review of data and procedures is accomplished by the monitoring activities of the Government through various reviews. These reviews are described in specific sections of this exhibit. Laboratory evaluation samples, electronic data audits, and data packages provide an external QA reference for the program. A Contractor on-site evaluation system is also part of the external QA monitoring. A feedback loop provides the results of the various review functions to the Contractors through direct communications with the Project Officer (PO).

2.1.2 This exhibit does not provide specific instructions for constructing QA Plans, QC systems, or a QA organization. It is, however, an explanation of the QA/QC requirements of the program. It outlines some minimum standards for QA/QC programs. It also includes specific items that are required in a Quality Assurance Plan (QAP) and by the QA/QC documentation detailed in this contract. Delivery of this documentation provides the Government with a complete stand-alone data package, and limits the need for contact with the Contractor or an analyst, at a later date, if some aspect of the analysis is questioned.

2.1.3 In order to assure that the product delivered by the Contractor meets the requirements of the contract, and to improve interlaboratory data comparison, the Government requires the following from the Contractor:

- Preparation of, and adherence to, a written QAP, the elements of which are designated in Section 4.0 of this exhibit;

- Preparation of, and adherence to, Standard Operating Procedures (SOPs), as described in Section 5.0 of this exhibit;

- Adherence to the analytical methods and associated QC requirements specified in the contract;

- Verification of analytical standards and documentation of the purity of neat materials and the purity and accuracy of solutions obtained from private chemical supply houses;

- Submission of all raw data and pertinent documentation for Regional review;

- Participation in the analysis of laboratory evaluation samples, including adherence to corrective action procedures;

- Submission, upon request, of instrument data tapes and applicable documentation for tape audits, including a copy of the Sample Data Package;

- Participation in on-site laboratory evaluations, including adherence to corrective action procedures; and

- Submission of all original documentation generated during sample analyses for Government review.

3.0 GENERAL QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PRACTICES

The Contractor shall adhere to good laboratory practices for laboratory cleanliness with regard to glassware and apparatus. The Contractor shall also adhere to good laboratory practices with regard to reagents, solvents, and gases. For additional guidelines regarding these general laboratory procedures, see the Handbook for Analytical Quality Control in Water and Wastewater Laboratories, USEPA-600/4-79-019, USEPA Environmental Monitoring Systems Laboratory, Cincinnati, Ohio, September 1982.

4.0 QUALITY ASSURANCE PLAN (QAP)

4.1 Introduction

The Contractor shall establish a Quality Assurance (QA) program with the objective of providing sound analytical chemical measurements. This program shall incorporate the Quality Control (QC) procedures, any necessary corrective action, all documentation required during data collection, and the quality assessment measures performed by management to ensure acceptable data production.

4.1.1 As evidence of such a program, the Contractor shall prepare a written QAP which describes the procedures that are implemented to:

- Maintain data integrity, validity, and usability;

- Ensure that analytical measurement systems are maintained in an acceptable state of stability and reproducibility;

- Detect problems through data assessment and establish corrective action procedures which keep the analytical process reliable; and

- Document all aspects of the measurement process to provide data which are technically sound and legally defensible.

4.1.2 The QAP must present, in specific terms, the policies, organization, objectives, functional guidelines, and specific QA/QC activities designed to achieve the data quality requirements in this contract. Where applicable, Standard Operating Procedures (SOPs) pertaining to each element shall be included or referenced as part of the QAP. The QAP shall be paginated consecutively in ascending order. The QAP shall be available during on-site laboratory evaluations and shall be submitted within 7 days of written request by the Project Officer (PO). Additional information

relevant to the preparation of a QAP can be found in USEPA and American Society for Testing and Materials (ASTM) publications.

4.2 Required Elements of a Quality Assurance Plan (QAP)

The required elements of a laboratory's QAP are outlined in this section. This outline should be used as a framework for developing the QAP.

A. Organization and Personnel

1.01 QA Policy and Objectives

2. QA Management

a. Organization

b. Assignment of QA/QC Responsibilities

c. Reporting Relationships

d. QA Document Control Procedures

e. QA Program Assessment Procedures

3. Personnel

a. Resumes

b. Education and Experience Pertinent to this Contract

c. Training Progress

B. Facilities and Equipment

1. Instrumentation and Backup Alternatives

2. Maintenance Activities and Schedules

C. Document Control

1. Laboratory Notebook Policy

2. Sample Tracking/Custody Procedures

3. Logbook Maintenance and Archiving Procedures

4. Sample Delivery Group (SDG) File Organization, Preparation, and Review Procedures

5. Procedures for Preparation, Approval, Review, Revision, and Distribution of SOPs

6. Process for Revision of Technical or Documentation Procedures

D. Analytical Methodology

1. Calibration Procedures and Frequency

2. Sample Preparation Procedures

3. Sample Analysis Procedures

4. Standards Preparation Procedures

5. Decision Processes, Procedures, and Responsibility for Initiation of Corrective Action

E. Data Generation

1. Data Collection Procedures
2. Data Reduction Procedures
3. Data Validation Procedures
4. Data Reporting and Authorization Procedures

F. QA

1. Data QA
2. Systems/Internal Audits
3. Performance/External Audits
4. Corrective Action Procedures
5. QA Reporting Procedures
6. Responsibility Designation

G. QC

1. Solvent, Reagent, and Adsorbent Check Analysis
2. Reference Material Analysis
3. Internal QC Checks
4. Corrective Action and Determination of QC Limit Procedures
5. Responsibility Designation

4.3 Updating and Submitting the Quality Assurance Plan (QAP)

4.3.1 Initial Submission

Within 60 days after contract award, the Contractor shall maintain on-file a revised QAP, fully compliant with the requirements of this contract. The revised QAP will become the official QAP under the contract and may be used during legal proceedings. The Contractor shall maintain the QAP on-file at the Contractor's facility for the term of the contract. Both the initial submission and the revised QAP shall be paginated consecutively in ascending order. The revised QAP shall include:

- Changes resulting from (1) the Contractor's internal review of their organization, personnel, facility, equipment, policy and procedures, and (2) the Contractor's implementation of the requirements of the contract; and
- Changes resulting from Government review of the laboratory evaluation sample data, contractor-supplied documentation, and recommendations made during the pre-award on-site laboratory evaluation.

4.3.1.1 The Contractor shall send a copy of the latest version of the QAP within 7 days of a request from the PO or CO. The PO or CO will designate the recipients.

4.3.2 Subsequent Updates and Submissions: During the term of contract, the Contractor shall amend the QAP when the following circumstances occur:

- USEPA modifies the contract;
- USEPA notifies the Contractor of deficiencies in the QAP document;
- USEPA notifies the Contractor of deficiencies resulting from USEPA's review of the Contractor's performance;

- The Contractor identifies deficiencies resulting from their internal review of their QAP document;

- The Contractor's organization, personnel, facility, equipment, policy, or procedures change; or

- The Contractor identifies deficiencies resulting from the internal review of their organization, personnel, facility, equipment, policy, or procedure changes.

4.3.2.1 The Contractor shall amend the QAP within 30 days of when the circumstances listed above result in a discrepancy between what was previously described in the QAP, and what is presently occurring at the Contractor's facility. When the QAP is amended, all changes in the QAP shall be clearly marked (e.g., a bar in the margin indicating where the change is found in the document, or highlighting the change by underlining the change, bold printing the change, or using a different print font). The amended section pages shall have the date on which the changes were implemented. The Contractor shall incorporate all amendments to the latest version of the QAP document. The Contractor shall archive all amendments to the QAP document for future reference by the Government.

4.3.2.2 The Contractor shall send a copy of the latest version of the QAP document within 7 days of a written request by the PO, as directed. The PO will designate the recipients.

5.0 STANDARD OPERATING PROCEDURES (SOPs)

5.1 Introduction

To obtain reliable results, adherence to prescribed analytical methodology is imperative. In any operation that is performed on a repetitive basis, reproducibility is best accomplished through the use of Standard Operating Procedures (SOPs). An SOP is a written document which provides directions for the step-by-step execution of an operation, analysis, or action which is commonly accepted as the method for performing certain routine or repetitive tasks.

5.1.1 SOPs prepared by the Contractor shall be functional (i.e., clear, comprehensive, up-to-date, and sufficiently detailed to permit duplication of results by qualified analysts). The SOPs shall be paginated consecutively in ascending order.

5.1.2 All SOPs shall reflect activities as they are currently performed in the laboratory. In addition, all SOPs shall be:

- Consistent with current USEPA regulations, guidelines, and the contract's requirements;

- Consistent with instrument(s) manufacturer's specific instruction manuals;

- Available to the Government during an on-site laboratory evaluation. A complete set of SOPs shall be bound together and available for inspection at such evaluations. During on-site laboratory evaluations, laboratory personnel may be asked to demonstrate the application of the SOPs;

- Available to designated recipients within 7 days, upon request by the Project Officer (PO);

- Capable of providing for the development of documentation that is sufficiently complete to record the performance of all tasks required by the protocol;

- Capable of demonstrating the validity of data reported by the Contractor and explaining the cause of missing or inconsistent results;

- Capable of describing the corrective measures and feedback mechanism utilized when analytical results do not meet protocol requirements;

- Reviewed regularly and updated as necessary when contract, facility, or Contractor procedural modifications are made;

- Archived for future reference in usability or evidentiary situations;
- Available at specific workstations, as appropriate; and
- Subject to a document control procedure which precludes the use of outdated or inappropriate SOPs.

5.2 Format

The format for SOPs may vary depending upon the type of activity for which they are prepared. However, at a minimum, the following sections shall be included:

- Title page;
- Scope and application;
- Definitions;
- Procedures;
- Quality Control (QC) limits;
- Corrective action procedures, including procedures for secondary review of information being generated;
- Documentation description and example forms;
- Miscellaneous notes and precautions; and
- References.

5.3 Requirements

The Contractor shall maintain the following SOPs:

5.3.1 Evidentiary SOPs for required Chain-of-Custody and document control, which are discussed in Exhibit F.

5.3.2 Sample receipt and storage SOPs to include:

- Sample receipt and identification logbooks;
- Refrigerator temperature logbooks;
- Extract storage logbooks; and
- Security precautions.

5.3.3 Sample preparation SOPs to include:

1.01 Reagent purity check procedures and documentation;

1.01 Extraction procedures;

1.01 Extraction bench sheets; and

1.02 Extraction logbook maintenance.

5.3.4 Glassware cleaning SOPs

5.3.5 Calibration (balances, etc.) SOPs to include:

- Procedures;
- Frequency requirements;
- Preventative maintenance schedule and procedures;

- Acceptance criteria and corrective actions; and
- Logbook maintenance authorization.

5.3.6 Analytical Procedures (for each analytical system) to include:

- Instrument performance specifications;
- Instrument operating procedures;
- Data acquisition system operation;
- Procedures used when automatic quantitation algorithms are overridden;
- QC-required parameters;
- Analytical run/injection logbooks; and
- Instrument error and editing flag descriptions and resulting corrective actions.

5.3.7 Maintenance activities (for each analytical system) to include:

- Preventative maintenance schedule and procedures;
- Corrective maintenance determinants and procedures; and
- Maintenance authorization.

5.3.8 Analytical standards to include:

- Standard coding/identification and inventory system;
- Standards preparation logbook(s);
- Standard preparation procedures;
- Procedures for equivalency/traceability analyses and documentation;
- Purity logbook (primary standards and solvents);
- Storage, replacement, and labeling requirements; and
- QC and corrective action measures.

5.3.9 Data reduction procedures to include:

- Data processing systems operation;
- Outlier identification methods;
- Identification of data requiring corrective action; and
- Procedures for format and/or forms for each operation.

5.3.10 Documentation policy/procedures to include:

- Contractor/analyst's notebook policy, including review policy;
- Complete Sample Delivery Group (SDG) File (CSF) contents;
- CSF organization and assembly procedures, including review policy; and
- Document inventory procedures, including review policy.

5.3.11 Internal data review/self-inspection procedures to include:

- Data flow and Chain-of-Command for data review;

- Procedures for measuring precision and accuracy;
- Evaluation parameters for identifying systematic errors;
- Procedures to assure that hardcopy and electronic deliverables are complete and compliant with the requirements in the Statement of Work (SOW) Exhibits B and H;
- Procedures to assure that hardcopy deliverables are in agreement with their comparable electronic deliverables;
- Demonstration of internal Quality Assurance (QA) inspection procedure (demonstrated by supervisory sign-off on personal notebooks, internal laboratory evaluation samples, etc.);
- Frequency and type of internal audits (e.g., random, quarterly, spot checks, perceived trouble areas);
- Demonstration of problem identification, corrective actions, and resumption of analytical processing. Sequence resulting from internal audit (i.e., QA feedback); and
- Documentation of audit reports (internal and external), response, corrective action, etc.

5.3.12 Data management and handling to include:

- Procedures for controlling and estimating data entry errors;
- Procedures for reviewing changes to data and deliverables and ensuring traceability of updates;
- Lifecycle management procedures for testing, modifying, and implementing changes to existing computing systems to include hardware, software, and documentation or installation of new systems;
- Database security, backup, and archival procedures including recovery from system failures;
- System maintenance procedures and response time;
- Individual(s) responsible for system operation, maintenance, data integrity, and security;
- Specifications for staff training procedures; and
- Storage, retrieval and verification of the completeness and readability of High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) files transferred to magnetic media.

5.4 Updating and Submitting Standard Operating Procedures (SOPs)

5.4.1 Initial Submission: <u>Within 60 days after contract award, the Contractor shall maintain on-file a complete revised set of SOPs, fully compliant with the requirements of this contract</u>. The revised SOPs will become the official SOPs under the contract and may be used during legal proceedings. The Contractor shall maintain the complete set of SOPs on-file at the Contractor's facility for the term of the contract. Both the initial submission of SOPs and the revised SOPs shall be paginated consecutively in ascending order. The revised SOPs shall include:

- Changes resulting from 1) the Contractor's internal review of their procedures, and 2) the Contractor's implementation of the requirements of the contract, and
- Changes resulting from the Government's review of the laboratory evaluation sample data, contractor supplied documentation, and recommendations made during the pre-award on-site laboratory evaluation.

5.4.1.1 The Contractor shall send a complete set of the latest version of SOPs or individually requested SOPs within 7 days of a request from the PO or CO.

5.4.2 Subsequent Updates and Submissions: During the term of the contract, the Contractor shall amend the SOPs when the following circumstances occur:

- USEPA modifies the contract;
- USEPA notifies the Contractor of deficiencies in their SOP documentation;
- USEPA notifies the Contractor of deficiencies resulting from USEPA's review of the Contractor's performance;
- The Contractor's procedures change;
- The Contractor identifies deficiencies resulting from the internal review of SOP documentation; or
- The Contractor identifies deficiencies resulting from the internal review of procedures.

5.4.2.1 Existing SOPs shall be amended or new SOPs shall be written within 30 days of when the circumstances listed above result in a discrepancy between what was previously described in the SOPs, and what is presently occurring at the Contractor's facility. All changes in the SOPs shall be clearly marked (e.g., a bar in the margin indicating where the change is in the document, or highlighting the change by underlining the change, bold printing the change, or using a different print font). The amended/new SOPs shall have the date on which the changes were implemented.

5.4.2.2 When existing SOPs are amended or new SOPs are written, the Contractor shall document the reasons for the changes and maintain the amended SOPs or new SOPs on-file. Documentation of the reasons for the changes shall be maintained on-file with the amended SOPs or new SOPs.

5.4.2.3 Documentation of the reason(s) for changes to the SOPs shall also be submitted along with the SOPs.

6.0 DELIVERABLE COMPLETENESS CHECK (DCC)

6.1 Overview

6.1.1 DCC is one aspect of the Government's contractual right of inspection of analytical data. DCC examines the Contractor's adherence to the contract requirements based on the Sample Data Package delivered to the Government.

6.1.2 To assure a uniform review, a set of standardized procedures has been developed to evaluate the Sample Data Package submitted by a Contractor against the technical and completeness requirements of the contract. The Government reserves the right to add and/or delete individual checks.

6.2 Deliverable Completeness Check (DCC) Results

DCC results are mailed to the Contractor and all other data recipients. The Contractor has a period of time to correct deficiencies. The Contractor shall send all corrections to the TOPO within 4 business days. DCC results are used in conjunction with other information to measure overall Contractor performance and to take appropriate actions to correct deficiencies in performance.

6.3 Deliverable Completeness Check (DCC) Trend Report

The Government may generate a DCC Trend Report which summarizes DCC results over a given period of time. The Government may send the DCC Trend Report to the contractor, or discuss the DCC Trend Report during an on-site laboratory evaluation.

7.0 ANALYTICAL STANDARDS REQUIREMENTS

7.1 Overview

USEPA may not supply analytical reference standards for either direct analytical measurements or the purpose of traceability. All contract laboratories shall be required to prepare, from materials or purchase from private chemical supply houses, those standards necessary to successfully and accurately perform the analyses required in this protocol.

7.2 Preparation of Chemical Standards from the Neat High Purity Bulk Material

7.2.1 If the laboratory cannot obtain analytical reference standards, the laboratory may prepare its own chemical standards. Laboratories shall obtain the highest purity possible when purchasing chemical standards. Standards purchased at less than 97% purity shall be documented as to why a higher purity could not be obtained.

7.2.2 If required by the manufacturer, the chemical standards shall be kept refrigerated when not being used in the preparation of standard solutions. Proper storage of chemicals is essential to safeguard them from decomposition.

7.2.3 The purity of a compound can sometimes be misrepresented by a chemical supply house. Since knowledge of purity is needed to calculate the concentration of solute in a solution standard, it is the Contractor's responsibility to have analytical documentation ascertaining that the purity of each compound is correctly stated. Purity confirmation, when performed, should use appropriate techniques. Use of two or more independent methods is recommended. The correction factor for impurity when weighing neat materials in the preparation of solution standards is determined using the following equation:

EQ. 1

$$\textbf{Weight of Impure Compound} = \frac{\textbf{weight of pure compound}}{\textbf{(percent purity/100)}}$$

Where:

Weight of Pure Compound = That required to prepare a specific volume of a solution standard of a specified concentration.

7.2.4 When compound purity is assayed to be 97% or greater, the weight may be used without correction to calculate the concentration of the stock standard. If the compound purity is assayed to be less than 97%, the weight shall be corrected when calculating the concentration of the stock solution.

7.2.5 Mis-identification of compounds occasionally occurs and it is possible that a mislabeled compound may be received from a chemical supply house. It is the Contractor's responsibility to have analytical documentation ascertaining that all compounds used in the preparation of solution standards are correctly identified. Identification confirmation, when performed, shall use Gas Chromatography/Mass Spectrometry (GC/MS) analysis on at least two different analytical columns, or other appropriate techniques.

7.2.6 Calculate the weight of material to be weighed out for a specified volume, taking into account the purity of the compound and the desired concentration. A second person shall verify the accuracy of the calculations. Check balances for accuracy with a set of standard weights every 12 hours. All weighing shall be performed on an analytical balance to the nearest 0.1 mg and verified by a second person. The solvent used to dissolve the solute shall be compatible with the protocol in which the standard is to be used; the solute shall be soluble, stable, and nonreactive with the solvent. In the case of a multicomponent solution, the components must not react with each other.

7.2.7 Transfer the solute to a volumetric flask and dilute to the specified solution volume with solvent after ensuring dissolution of the solute in the solvent. Sonication or warming may be performed to promote dissolution of the solute. This solution shall be called the primary standard and all subsequent dilutions shall be traceable back to the primary standard.

7.2.8 Log notebooks are to be kept for all weighing and dilutions. All subsequent dilutions from the primary standard and the calculations for determining their concentrations are to be recorded and verified by a second person. All solution standards are to be refrigerated, if required, when not in use. All solution standards are to be clearly labeled to include the identity of the analyte or analytes, concentration, date prepared, solvent, and initials of the preparer.

7.3 Purchase of Chemical Standards Already in Solution

Solutions of analytical reference standards can be purchased by Contractors provided they meet the following criteria.

7.3.1 Contractors shall maintain documentation of the purity confirmation of the material to verify the integrity of the standard solutions they purchase.

7.3.2 The Contractor shall purchase standards for which the quality is demonstrated statistically and analytically by a method of the supplier's choice. One way this can be demonstrated is to prepare and analyze three solutions: a high standard; a low standard, and a standard at the target concentration (see Sections 7.3.2.1 and 7.3.2.2). The supplier must then demonstrate that the analytical results for the high standard and low standard are consistent with the difference in theoretical concentrations. This is done by the Student's t-test in Section 7.3.2.4. If consistency is achieved, the supplier must then demonstrate that the concentration of the target standard lies midway between the concentrations of the low and high standards. This is done by the Student's t-test in Section 7.3.2.5. Then, the standard is certified to be within 10% of the target concentration using the equations in Section 7.3.2.6. If the procedure above is used, the supplier must document that the following have been achieved.

7.3.2.1 Two solutions of identical concentration shall be prepared independently from neat materials. An aliquot of the first solution shall be diluted to the intended concentration (the "target standard"). One aliquot is taken from the second solution and diluted to a concentration 10% greater than the target standard. This is called the "high standard". One further aliquot is taken from the second solution and diluted to a concentration 10% less than the target standard. This is called the "low standard".

7.3.2.2 Using the equation below, six replicate analyses of each standard (a total of 18 analyses) shall be performed in the following sequence: low standard, target standard, high standard; low standard, target standard, high standard, etc.

EQ. 2

7.3.2.3 The mean and variance of the six results for each solution shall be calculated using the following equation:

$$\text{Mean} = \frac{\sum_{i=1}^{6} Y_i}{6}$$

EQ. 3

Where:

The values Y_1, Y_2, Y_3, ..., represent the results of the six analyses of each standard.

$$\text{Variance} = \frac{\sum_{i=0}^{6} Y_i^2 - 6(\text{MEAN})^2}{5}$$

The means of the low, target, and high standards are designated M_1, M_2, and M_3, respectively.

The variances of the low, target, and high standards are designated V_1, V_2, and V_3, respectively.

Additionally, a pooled variance, V_p, is calculated using the following equation.

EQ. 4

$$V_p = \frac{\frac{V_1}{0.81} + V_2 + \frac{V_3}{1.21}}{3}$$

If the square root of V_p is less than 1% of M_2, $M_2^2/10{,}000$, it is to be used as the value of V_p in all subsequent calculations.

7.3.2.4 The test statistic shall be calculated using the following equation:

EQ. 5

$$\textbf{Test Statistic} = \frac{\left| \frac{M_3}{1.1} - \frac{M_1}{0.9} \right|}{\left(\frac{V_p}{3} \right)^{0.5}}$$

If the test statistic exceeds 2.13, the supplier has failed to demonstrate a 20% difference between the high and low standards. In such a case, the standards are not acceptable.

7.3.2.5 The test statistic shall be calculated using the following equation:

EQ. 6

$$\textbf{Test Statistic} = \frac{\left| M_2 - \left(\frac{M_1}{1.8} \right) - \left(\frac{M_3}{2.2} \right) \right|}{\left(\frac{V_p}{4} \right)^{0.5}}$$

If the test statistic exceeds 2.13, the supplier has failed to demonstrate that the target standard concentration is midway between the high and low standards. In such a case, the standards are not acceptable.

7.3.2.6 The 95% confidence intervals for the mean result of each standard shall be calculated using the following equations:

EQ. 7

$$\textbf{Interval for Low Standard} = M_1 \pm 2.13 \left(\frac{V_p}{6} \right)^{0.5}$$

EQ. 8

$$\textbf{Interval for Target Standard} = M_2 \pm 2.13 \left(\frac{V_p}{6} \right)^{0.5}$$

EQ. 9

$$\textbf{Interval for High Standard} = M_3 \pm 2.13 \left(\frac{V_p}{6}\right)^{0.5}$$

7.3.2.6.1 These intervals shall not overlap. If overlap is observed, the supplier has failed to demonstrate the ability to discriminate the 10% difference in concentrations. In such a case, the standards are not acceptable.

7.3.2.6.2 In any event, the Contractor is responsible for the quality of the standards employed for analyses under this contract.

7.4 Requesting Standards from the USEPA Standards Repository

Solutions of analytical reference materials can be ordered from the USEPA Chemical Standards Repository, depending on availability. The Contractor may place an order for standards only after demonstrating that these standards are not available from commercial vendors, either in solution or as a neat material.

7.5 Documentation of the Verification and Preparation of Chemical Standards

It is the responsibility of the Contractor to maintain the necessary documentation to show that the chemical standards used in the performance of the analysis conform to the requirements previously listed.

7.5.1 Weighing logbooks, calculations, raw data, etc., whether produced by the Contractor or purchased from chemical supply houses, shall be maintained by the Contractor and may be subject to review during on-site inspection visits. In those cases where the documentation is supportive of the analytical results of data packages sent to the Government, such documentation is to be kept on-file by the Contractor for a period of one year.

7.5.2 Upon request by the Project Officer (PO), the Contractor shall submit their most recent previous year's documentation (12 months) for the verification and preparation of chemical standards within 14 days of receipt of the request to the designated recipients.

7.5.3 The Government may generate a report discussing deficiencies in the Contractor's documentation for the verification and preparation of chemical standards, or they may discuss the deficiencies during an on-site laboratory evaluation.

8.0 DATA PACKAGE AUDITS

8.1 Overview

Data package audits may be performed by the Government for program overview and specific Regional concerns. Data packages may be periodically selected from recently received Cases and evaluated for the technical quality of hardcopy raw data, Quality Assurance (QA), and the adherence to contractual requirements. This function provides external monitoring of program Quality Control (QC) requirements. Data package audits are used to assess the technical quality of the data and evaluate overall laboratory performance. Audits provide the Government with an in-depth inspection and evaluation of the Case data package with regard to achieving QA/QC acceptability.

8.2 Responding to the Data Package Audit Report

8.2.1 After completion of the data package audit, the Government may send a copy of the data package audit report to the Contractor, or discuss the data package audit report on an on-site laboratory evaluation. In a detailed letter to the Project Officer (PO) and the designated recipient, the Contractor shall discuss the corrective actions implemented to resolve the deficiencies listed in the data package audit report.

9.0 RESERVED

10.0 PROFICIENCY TESTING

As a means of measuring and evaluating both the Contractor's and the method's analytical performance, the Contractor shall participate in USEPA's Proficiency Testing Program. USEPA's Proficiency Testing Program involves the analysis of Case-specific Performance Evaluation (PE) samples and the participation in interlaboratory Performance Evaluation audits. The Contractor's PE sample results will be used by the Government to assess and verify the Contractor's continuing ability to produce acceptable analytical data in accordance with the contractual requirements.

10.1 Performance Evaluation (PE) Samples

10.1.1 The PE sample(s) may be scheduled with the Contractor as frequently as on a Sample Delivery Group (SDG)-by-SDG basis but no less than once per year.

10.1.2 PE samples will be provided as either single-blinds (recognizable as a PE sample, but of unknown composition), or as double-blinds (not recognizable as a PE sample and of unknown composition). The Contractor will not be informed of either the analytes/parameters or the concentrations in the PE samples.

10.1.3 The Contractor may receive the PE samples as either full volume samples or ampulated/bottled concentrates from USEPA or a designated USEPA Contractor. The PE samples shall come with instructions concerning the unique preparation procedures, if any, required to reconstitute the PE samples (i.e., the required dilution of the PE sample concentrate). PE samples are to be extracted and analyzed with the rest of the routine samples in the SDG. The Contractor shall prepare and analyze the PE sample using the procedure described in the sample preparation and method analysis sections of Exhibit D. All contract required Quality Control (QC) shall also be met. The PE sample results are to be submitted in the SDG deliverable package per normal reporting procedures detailed in Exhibit B.

10.1.4 In addition to PE sample preparation and analysis, the Contractor shall be responsible for correctly identifying and quantitating the analytes/parameters included in each PE sample. When PE sample results are received by USEPA, the PE sample results will be evaluated for correct analytical identification and quantitation. The results of the PE sample evaluation will be provided to the Contractor via coded evaluation sheets, by analyte/parameter. USEPA will notify the Contractor of unacceptable performance. USEPA reserves the right to adjust the PE sample acceptance windows to compensate for any unanticipated difficulties with a particular PE sample.

10.1.5 The Contractor shall demonstrate acceptable analytical performance for both identification and quantitation of PE sample analytes/parameters.

11.0 ON-SITE LABORATORY EVALUATIONS

11.1 Overview

As dictated by a contract laboratory's performance, the Project Officer (PO) or their authorized representative may conduct an on-site laboratory evaluation. On-site laboratory evaluations are carried out to monitor the Contractor's ability to meet selected terms and conditions specified in the contract. The evaluation process may incorporate two separate categories: Quality Assurance (QA) Evaluation and an Evidentiary Audit.

11.2 Quality Assurance (QA) On-Site Evaluation

QA evaluators inspect the Contractor's facilities to verify the adequacy and maintenance of instrumentation, the continuity, experience and education of personnel, and the acceptable performance of analytical and Quality Control (QC) procedures.

11.2.1 The Contractor should expect that items to be monitored will include, but not be limited to, the following:

- Size and appearance of the facility;
- Quantity, age, availability, scheduled maintenance, and performance of instrumentation;

- Availability, appropriateness, and utilization of the Quality Assurance Plan (QAP) and Standard Operating Procedures (SOPs);
- Staff qualifications, experience, and personnel training programs;
- Reagents, standards, and sample storage facilities;
- Standard preparation logbooks and raw data;
- Bench sheets and analytical logbook maintenance and review; and
- Review of the Contractor's sample analysis/data package inspection/data management procedures.

11.2.2 Prior to an on-site evaluation, various documentation pertaining to performance of the specific Contractor is integrated into a profile package for discussion during the evaluation. Items that may be included are:

- Previous on-site reports;
- Performance Evaluation (PE) sample scores;
- Regional review of data;
- Regional QA materials;
- Data audit reports;
- Results of Deliverable Completeness Check (DCC); and
- Data trend reports.

11.3 Evidentiary Audit

Evidence auditors conduct an on-site laboratory evaluation to determine if laboratory policies and procedures are in place to satisfy evidence handling requirements, as stated in Exhibit F. The evidence audit comprises a procedural audit, an audit of written SOPs, and an audit of analytical project file documentation.

11.3.1 Procedural Audit

The procedural audit consists of review and examination of actual SOPs and accompanying documentation for the following laboratory operations:

- Sample receiving;
- Sample storage;
- Sample identification;
- Sample security;
- Sample tracking (from receipt to completion of analysis);
- Analytical project file organization and assembly; and
- Proper disposal of samples and cogenerated wastes.

11.3.2 Written SOPs Audit

The written SOPs audit consists of review and examination of the written SOPs to determine if they are accurate and complete for the following laboratory operations:

- Sample receiving;
- Sample storage;

- Sample identification;
- Sample security;
- Sample tracking (from receipt to completion of analysis); and
- Analytical project file organization and assembly.

11.3.3 Analytical Project File Evidence Audit

The analytical project file evidence audit consists of review and examination of the analytical project file documentation. The auditors review the files to determine:

- The accuracy of the document inventory;
- The completeness of the file;
- The adequacy and accuracy of the document numbering system;
- Traceability of sample activity;
- Identification of activity recorded on the documents; and
- Error correction methods.

11.4 Discussion of the On-Site Team's Findings

The QA and evidentiary auditors discuss their findings with the PO and/or authorized representatives prior to debriefing the Contractor. During the debriefing, the auditors present their findings and recommendations for corrective actions necessary to the Contractor personnel.

11.5 Corrective Action Reports for Follow-Through to Quality Assurance (QA) and Evidentiary Audit Reports

Following an on-site laboratory evaluation, QA and/or evidentiary audit reports which discuss deficiencies found during the on-site evaluation may be sent to the Contractor. In a detailed letter, the Contractor shall discuss the corrective actions implemented to resolve the deficiencies discussed during the on-site evaluation, and discussed in the report(s) to the PO.

12.0 ELECTRONIC DATA AUDITS

12.1 Overview

12.1.1 Periodically, USEPA may request the High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) magnetic tapes from Contractors for a specific Case to perform tape audits. Generally, tape submissions and audits are requested for the following reasons:

- Program overview;
- Indication of data quality problems;
- Support for on-site audits; and
- Specific Regional requests.

12.1.2 Depending upon the reason for an audit, tapes from a recent Case, a specific Case, or a laboratory evaluation sample may be requested. Tape audits provide a mechanism to assess adherence to contractual requirements, and to ensure the consistency of data reported on the hardcopy/floppy diskettes with that generated on the HRGC/HRMS tapes. This function provides external monitoring of program Quality Control (QC) requirements and checks adherence of the Contractor to internal Quality Assurance (QA) procedures. In addition, tape audits enable the USEPA to evaluate the utility, precision, and accuracy of the analytical methods.

12.1.3 The Contractor shall store all raw and processed HRGC/HRMS data on magnetic tape (i.e., magnetic tape, zip disk, diskette, etc.) or CD-ROM, in appropriate instrument manufacturer's format. This tape shall include data for samples, blanks, Laboratory Control Samples (LCSs), initial calibrations, calibration verifications, system performance checks, Window Defining Mixtures (WDMs), isomer specificity checks, and column performance standards, as well as all Contractor-generated spectral libraries and quantitation reports required to generate the data package. The Contractor shall maintain a written reference logbook of tape files of the sample number, calibration data, standards, and blanks. The logbook shall include sample numbers and standard and blank IDs, identified by Case and Sample Delivery Group (SDG).

12.1.4 The Contractor is required to retain the HRGC/HRMS tapes for 3 years after submission of the reconciled Complete SDG File (CSF). When submitting HRGC/HRMS tapes to the USEPA, the following materials shall be delivered in response to the request:

12.1.4.1 All associated raw data files for samples, including laboratory evaluation and QC samples, blanks, LCSs, initial calibration and calibration verification standards, and system instrument performance check solutions (WDM, Column Performance Solution [CPS], and perfluorokerosene [PFK]).

12.1.4.2 All processed data files and quantitation output files associated with the raw data files described in Section 12.1.4.1.

12.1.4.3 All associated identifications and calculation files used to generate the data submitted in the data package.

12.1.4.4 A copy of the Contractor's written reference logbook relating tape files to sample numbers, calibration data, standards, blanks, and LCSs. The logbook shall include sample numbers and Lab File identifiers for all samples, blanks, and standards, identified by Case and SDG.

12.1.4.5 A directory of files on all tapes.

12.1.4.6 A copy of the completed sample data package, if audit request is made within the period during which the Contractor must retain a copy of the Sample Data Package.

12.1.4.7 A statement attesting to the completeness of the HRGC/HRMS data tape submission, signed and dated by the Contractor's Laboratory Manager. The Contractor shall also provide a statement attesting that the data reported have not been altered in any way. These statements shall be part of a cover sheet that includes the following information relevant to the data tape submission:

- Contractor name;
- Date of submission;
- Case number;
- SDG number;
- HRGC/HRMS make and model number;
- Software version;
- Disk drive type (e.g., CDC, PRIAM, etc.);
- File transfer method (e.g., Document Structure Definition [DSD], Document Type Definition [DTD], File Transfer Protocol [FTP], Aquarius, etc.);
- Data system computer;
- System operating software;
- Data system network;
- Tape backup software;

- Tape backup hardware;
- Data analysis software;
- Volume of data (in MB) backed up on each tape; and
- Names and telephone numbers of two Contractor contacts for further information regarding the submission.

12.2 Submission of the High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) Tape

12.2.1 Upon request of Project Officer (PO), the Contractor shall send the required HRGC/HRMS tapes and all necessary documentation to the designated recipient within 7 days of notification.

NOTE: The HRGC/HRMS tapes shall be shipped according to the procedures described in Exhibit F.

12.3 Responding to the High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS) Tape Audit Report

After completion of the HRGC/HRMS tape audit, the USEPA may send a copy of the HRGC/HRMS tape audit report to the Contractor or may discuss the HRGC/HRMS tape audit report at an on-site laboratory evaluation. In a detailed letter to the PO, the Contractor shall discuss the corrective actions implemented to resolve the deficiencies listed in the HRGC/HRMS tape audit report.

13.0 RESERVED

14.0 DATA MANAGEMENT

14.1 Overview

14.1.1 Data management procedures are defined as procedures specifying the acquisition, entry, update, correction, deletion, storage, and security of computer readable data and files. These procedures shall be developed by the contractor, be in written form and contain a clear definition for all databases and files used to generate or resubmit deliverables. Key areas of concern include: system organization (including personnel and security); documentation operations; traceability, and Quality Control (QC).

14.1.2 Data manually entered from hardcopy shall be subject to QC checks and the error rates estimated. Systems should prevent entry of incorrect or out-of-range data and alert data entry personnel of errors. In addition, data entry error rates shall be estimated and recorded on a monthly basis by re-entering a statistical sample of the data entered and calculating discrepancy rates by data element.

14.2 Documenting Data Changes

The record of changes in the form of corrections and updates to data originally generated, submitted, and/or resubmitted shall be documented to allow traceability of updates. Documentation shall include the following for each change:

- Justification or rationale for the change;
- Initials of the person making the change(s). Data changes shall be implemented and reviewed by a person or group independent of the source generating the deliverable;
- Documentation of changes shall be retained according to the schedule of the original deliverable;
- Resubmitted diskettes or other deliverables shall be re-inspected as a part of the laboratory's internal inspection process prior to resubmission. The entire deliverable, not just the changes, shall be inspected;

- The Laboratory Manager shall approve changes to originally submitted deliverables; and

- Documentation of data changes may be requested by laboratory auditors.

14.3 Lifecycle Management Procedures

Lifecycle management procedures shall be applied to computer software systems developed by the Contractor to be used to generate and edit contract deliverables. Such systems shall be thoroughly tested and documented prior to utilization.

14.3.1 A software test and acceptance plan including test requirements, test results, and acceptance criteria shall be developed, followed, and available in written form.

14.3.2 System changes shall not be made directly to production systems generating deliverables. Changes shall be made first to a development system, and tested prior to implementation.

14.3.3 Each version of the production system shall be given an identification number, a date of installation, and a date of last operation, and will be archived.

14.3.4 System and operations documentation shall be developed and maintained for each system. Documentation shall include a user's manual and operations and maintenance manuals.

14.3.5 This documentation shall be available for on-site review and/or upon written request by the Project Officer or Contracting Officer.

14.4 Personnel Responsibilities

Individual(s) responsible for the following functions shall be identified:

- System operation and maintenance including documentation and training;

- Database integrity, including data entry, data updating and QC; and

- Data and system security, backup, and archiving.

ATTACHMENT 6

SOW- EXHIBIT F - CHAIN-OF-CUSTODY, DOCUMENT CONTROL, AND WRITTEN STANDARD OPERATING PROCEDURES

EXHIBIT F

CHAIN-OF-CUSTODY, DOCUMENT CONTROL,
AND WRITTEN STANDARD OPERATING PROCEDURES (SOPs)

Exhibit F - Chain-of-Custody, Document Control, and
Written Standard Operating Procedures (SOPs)

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1.0 INTRODUCTION

A sample is physical evidence collected from a facility or the environment. Controlling evidence is an essential part of the hazardous waste investigation effort. To ensure that sample data and records supporting sample-related activities are admissible and have weight as evidence in future litigation, Contractors are required to maintain Government furnished samples under Chain-of-Custody and to account for all samples and supporting records of sample handling, preparation, and analysis. Contractors shall maintain sample identity, sample custody, and all sample-related records according to the requirements in this exhibit.

1.1 Purpose of Evidence Requirements

The purpose of the evidence requirements include:

- Ensuring traceability of samples while in possession of the Contractor;
- Ensuring sample Chain-of-Custody while in possession of the Contractor;
- Ensuring the integrity of sample identity while in possession of the Contractor;
- Ensuring sample-related activities are recorded on documents or in other formats for sample receipt, storage, preparation, analysis, and disposal;
- Ensuring all laboratory records for each specified Sample Delivery Group (SDG) will be accounted for when the project is completed, and
- Ensuring that all laboratory records directly related to Government furnished samples are assembled and delivered to the Government or, prior to delivery, are available upon the Government's request.

2.0 STANDARD OPERATING PROCEDURES (SOPs)

The Contractor shall implement the following SOPs for sample receiving, sample identification, sample security, sample storage, sample tracking and document control, computer-resident sample data control, and Complete Sample Delivery Group (SDG) File (CSF) organization and assembly to ensure accountability of sample Chain-of-Custody, as well as control of all sample-related records.

2.1 Sample Receiving

2.1.1 The Contractor shall designate a sample custodian responsible for receiving Government furnished samples.

2.1.2 The Contractor shall designate a representative to receive Government furnished samples in the event that the sample custodian is not available.

2.1.3 Upon receipt, the condition of shipping containers and sample containers shall be inspected and recorded on Form DC-1 by the sample custodian or a designated representative.

2.1.4 Upon receipt, the condition of the custody seals (intact/broken) shall be inspected and recorded on Form DC-1 by the sample custodian or a designated representative.

2.1.5 The sample custodian or a designated representative shall verify and record on Form DC-1, the agreement or disagreement of information recorded on all documents received with samples and information recorded on sample containers.

2.1.6 The sample custodian or a designated representative shall verify and record the following information on Form DC-1 as samples are received and inspected:

- Presence or absence and condition of custody seals on shipping and/or sample containers;
- Custody seal numbers, when present;
- Condition of the sample bottles;

- Presence or absence of airbills or airbill stickers;
- Airbill or airbill sticker numbers;
- Presence or absence of Chain-of-Custody records;
- Sample tags listed/not listed on Chain-of-Custody records;
- Presence or absence of packing lists;
- Cooler temperature;
- Date of receipt;
- Time of receipt;
- Designated sample numbers;
- Presence or absence of sample tags;
- Sample tag numbers;
- Assigned laboratory numbers;
- Samples delivered by hand; and
- Problems and discrepancies.

2.1.7 The sample custodian or a designated representative shall sign, date, and record the time on all accompanying forms, when applicable, at the time of sample receipt (e.g., Chain-of-Custody/Traffic Reports or packing lists, and airbills).

NOTE: Initials are not acceptable.

2.1.8 The Contractor shall contact the Task Order Project Officer (TOPO)to resolve problems and discrepancies including, but not limited to: absent documents; conflicting information; absent or broken custody seals; and unsatisfactory sample condition (e.g., leaking sample container).

2.1.9 The Contractor shall record resolution of problems and discrepancies by the TOPO.

2.2 Sample Identification

2.2.1 The Contractor shall maintain the identity of Government furnished samples and prepared samples (including extracted samples, digested samples, and distilled samples) throughout the laboratory.

2.2.2 Each sample and sample preparation container shall be labeled with the designated sample number or a unique laboratory sample identification number.

2.3 Sample Security

2.3.1 The Contractor shall demonstrate that sample custody is maintained from receiving through retention or disposal. A sample is in custody if:

- It is in your possession; or
- It is in your view after being in your possession; or
- It is locked in a secure area after being in your possession; or
- It is in a designated secure area, accessible only to authorized personnel.

2.3.2 The Contractor shall demonstrate security of designated secure areas.

2.4 Sample Storage

The Contractor shall designate storage areas for Government furnished samples and prepared samples.

2.5 Sample Tracking and Document Control

2.5.1 The Contractor shall record all activities performed on Government furnished samples.

2.5.2 Titles which identify the activities recorded shall be printed on each page of all laboratory documents. (Activities include, but are not limited to: sample receipt; sample storage; sample preparation, and sample analysis.) When a document is a record of analysis, the instrument type and parameter group shall be included in the title.

2.5.3 When columns are used to organize information recorded on laboratory documents, the information recorded in the columns shall be identified in a column heading.

2.5.4 Reviewers' signatures shall be identified on laboratory documents when reviews are conducted.

NOTE: Individuals recording review comments on computer-generated raw data are not required to be identified unless the written comments address data validity.

2.5.5 The laboratory name shall be identified on pre-printed laboratory documents.

2.5.6 Each laboratory document entry shall be dated in the format MM/DD/YYYY (e.g., 01/01/2000) and signed (or initialed) by the individual(s) responsible for performing the recorded activity at the time the activity is recorded.

2.5.7 Notations on laboratory documents shall be recorded in ink.

2.5.8 Corrections to laboratory data reporting forms and raw data shall be made by drawing single lines through the errors and entering the correct information. Information shall not be obliterated or rendered unreadable. Corrections and additions to information shall be signed (or initialed) and dated.

2.5.9 Unused portions of laboratory documents shall be lined-out.

2.5.10 Pages in bound and unbound logbooks shall be sequentially numbered.

2.5.11 Instrument-specific run logs shall be maintained to enable the reconstruction of run sequences.

2.5.12 Logbook entries shall be in chronological order.

2.5.13 Logbook entries shall include only one SDG per page, except in the event where SDGs "share" Quality Control (QC) samples (e.g., instrument run logs and extraction logs).

2.5.14 Information inserted into laboratory documents shall be affixed permanently in-place. The individual responsible for inserting information shall sign and date across the insert and logbook page at the time information is inserted.

2.5.15 Each page in bound and unbound logbooks shall be dated (MM/DD/YYYY) and signed (no initials) at the bottom by the individual recording the activity (if a single entry is made on a page) or by the last individual recording information on the page (if multiple entries are on the same page).

2.5.16 The Contractor shall document disposal or retention of Government furnished samples, remaining portions of samples, and prepared samples.

2.6 Computer-Resident Sample Data Control

2.6.1 Contractor personnel responsible for original data entry shall be identified at the time of data input.

2.6.2 The Contractor shall make changes to electronic data in a manner which ensures that the original data entry is preserved, the editor is identified, and the revision date is recorded.

2.6.3 The Contractor shall routinely verify the accuracy of manually entered data, electronically entered data, and data acquired from instruments.

2.6.4 The Contractor shall routinely verify documents produced by the electronic data collection system to ensure accuracy of the information reported.

2.6.5 The Contractor shall ensure that the electronic data collection system is secure.

2.6.5.1 The electronic data collection system shall be maintained in a secure location.

2.6.5.2 Access to the electronic data collection system functions shall be limited to authorized personnel through utilization of software security techniques (e.g., log-ons or restricted passwords).

2.6.5.3 Electronic data collection systems shall be protected from the introduction of external programs or software (e.g., viruses).

2.6.6 The Contractor shall designate archive storage areas for electronic data and the software required to access the data.

2.6.7 The Contractor shall designate an individual responsible for maintaining archives of electronic data, including the software.

2.6.8 The Contractor shall maintain the archives of electronic data and necessary software in a secure location that shall be accessible only to authorized personnel.

2.7 Complete Sample Delivery Group (SDG) File (CSF) Organization and Assembly

2.7.1 The Contractor shall designate a Document Control Officer responsible for the organization and assembly of the CSF.

2.7.2 The Contractor shall designate a representative responsible for the organization and assembly of the CSF in the event that the Document Control Officer is not available.

2.7.3 The Contractor shall maintain documents relating to the CSF in a secure location.

2.7.4 All original laboratory forms and copies of SDG-related logbook pages shall be included in the CSF.

2.7.5 Copies of laboratory documents in the CSF shall be photocopied in a manner to provide complete and legible replicates.

2.7.6 Documents relevant to each SDG including, but not limited to, the following shall be included in the CSF:

A. Logbook pages;
- Bench sheets;
- Screening records;
- Preparation records;
- Repreparation records;
- Analytical records;
- Re-analysis records;
- Records of failed or Attempted analysis;
- Custody records;
- Sample tracking records;
- Raw data summaries;
- Computer printouts;
- Correspondence;
- FAX originals;
- Library search results, and
- Other.

2.7.7 The Document Control Officer or a designated representative shall ensure that sample tags are encased in clear plastic bags before placing them in the CSF.

2.7.8 CSF documents shall be organized and assembled on an SDG-specific basis.

2.7.9 Original documents which include information relating to more than one SDG (e.g., Chain-of-Custody records, Traffic Reports, calibration logs) shall be filed in the CSF of the lowest SDG number, and copies of these originals shall be placed in the other CSF(s). The Document Control Officer or a designated representative shall record the following statement on the copies in (indelible) *dark ink*:

ORIGINAL DOCUMENTS ARE INCLUDED IN CSF _____

_____
Signature

_____
Date

2.7.10 All CSFs shall be submitted with a completed Form DC-2. All resubmitted CSFs shall be submitted with a new or revised Form DC-2.

2.7.11 Each item in the CSF and resubmitted CSFs shall be inventoried and assembled in the order specified on Form DC-2. Each page of the CSF shall be stamped with a sequential number. Page number ranges shall be recorded in the columns provided on Form DC-2. Intentional gaps in the page numbering sequence shall be recorded in the "Comments" section on Form DC-2. When inserting new or inadvertently omitted documents, the Contractor shall identify them with unique accountable numbers. The unique accountable numbers and the locations of the documents shall be recorded in the "Other Records" section on Form DC-2.

2.7.12 Before shipping each CSF, the Document Control Officer or a designated representative shall verify the agreement of information recorded on all documentation and ensure that the information is consistent and the CSF is complete.

2.7.13 The Document Control Officer, or a designated representative, shall document the shipment of deliverable packages, including what was sent, to whom the packages were sent, the date, and the carrier used.

2.7.14 Shipments of deliverable packages, including re-submittals, shall be sealed with custody seals by the Document Control Officer or a designated representative in a manner such that opening the packages would break the seals.

2.7.15 Custody seals shall be signed and dated by the Document Control Officer or a designated representative when sealing deliverable packages.

3.0 WRITTEN STANDARD OPERATING PROCEDURES (SOPs)

The Contractor shall develop and implement the following written SOPs for sample receiving, sample identification, sample security, sample storage, sample tracking and document control, computer-resident sample data control, and Complete Sample Delivery Group (SDG) File (CSF) organization and assembly to ensure accountability for USEPA sample Chain-of-Custody and control of all Government furnished sample-related records.

3.1 Sample Receiving

3.1.1 The Contractor shall have written SOPs for sample receiving which accurately reflect the procedures used by the laboratory.

3.1.2 The written SOPs for sample receiving shall ensure that the procedures listed below are in-use at the laboratory.

3.1.2.1 The condition of shipping containers and sample containers are inspected and recorded on Form DC-1 upon receipt by the sample custodian or a designated representative.

3.1.2.2 The condition of custody seals are inspected and recorded on Form DC-1 upon receipt by the sample custodian or a designated representative.

3.1.2.3 The presence or absence of the following documents/items accompanying the sample shipment is verified and recorded on Form DC-1 by the sample custodian or a designated representative:

- Custody seals;
- Chain-of-Custody records;
- Traffic Reports or packing lists;
- Airbills or airbill stickers; and
- Sample tags.

3.1.2.4 The agreement or disagreement of information recorded on shipping documents with information recorded on sample containers is verified and recorded on Form DC-1 by the sample custodian or a designated representative.

3.1.2.5 The following information is recorded on Form DC-1 by the sample custodian or a designated representative as samples are received and inspected:

- Custody seal numbers, when present;
- Airbill or airbill sticker numbers;
- Sample tag numbers listed/not listed on Chain-of-Custody records;
- Cooler temperature;
- Date of receipt;
- Time of receipt;
- Designated sample numbers;
- Sample tag numbers;
- Assigned laboratory numbers;
- Samples delivered by hand; and
- Problems and discrepancies.

3.1.2.6 All accompanying forms are signed, dated, and the time is recorded, when applicable, at the time of sample receipt (e.g., Chain-of-Custody records/Traffic Reports or packing lists, and airbills) by the sample custodian or a designated representative.

3.1.2.7 The Task Order Project Officer is contacted to resolve problems and discrepancies including, but not limited to: absent documents; conflicting information; absent or broken custody seals and unsatisfactory sample condition (e.g., leaking sample container).

3.1.2.8 The resolution of problems and discrepancies by the TOPO is recorded.

3.2 Sample Identification

3.2.1 The Contractor shall have written SOPs for sample identification which accurately reflect the procedures used by the laboratory.

3.2.2 The written SOPs for sample identification shall ensure that the procedures listed below are in use at the laboratory.

3.2.2.1 The identity of Government furnished samples and prepared samples is maintained throughout the laboratory when:

- The Contractor assigns unique laboratory sample identification numbers, thus the written SOPs shall include a description of the procedure used to assign these numbers;

- The Contractor uses prefixes or suffixes in addition to laboratory sample identification numbers, thus the written SOPs shall include their definitions; and

- The Contractor uses methods to uniquely identify fractions/parameter groups and matrix type, thus the written SOPs shall include a description of these methods.

3.2.2.2 Each sample and sample preparation container is labeled with the Government assigned number or a unique laboratory sample identification number.

3.3 Sample Security

3.3.1 The Contractor shall have written SOPs for sample security which accurately reflect the procedures used by the laboratory.

3.3.2 The written SOPs for sample security shall include the items listed below.

3.3.2.1 Procedures which ensure the following:

- Sample custody is maintained, and

- The security of designated secure areas is maintained.

3.3.2.2 A list of authorized personnel who have access to locked storage areas.

3.4 Sample Storage

3.4.1 The Contractor shall have written SOPs for sample storage which accurately reflect the procedures used by the laboratory.

3.4.2 The written SOPs for sample storage shall describe locations, contents, and identities of all storage areas for Government furnished samples and prepared samples in the laboratory.

3.5 Sample Tracking and Document Control

3.5.1 The Contractor shall have written SOPs for sample tracking and document control which accurately reflect the procedures used by the laboratory.

3.5.2 The written SOPs for sample tracking and document control shall include the items listed below.

3.5.2.1 Examples of all laboratory documents used during sample receiving, sample storage, sample transfer, sample analyses, CSF organization and assembly, and sample retention or disposal.

3.5.2.2 Procedures which ensure the following:

- All activities performed on Government furnished samples are recorded;

- Titles which identify the activities recorded are printed on each page of all laboratory documents;

- Information recorded in columns is identified with column headings;

- Reviewers' signatures are identified on laboratory documents;

- The laboratory name is included on pre-printed laboratory documents;

- Laboratory document entries are signed and dated in the format MM/DD/YYYY (e.g., 01/01/2000);

- Entries on all laboratory documents are recorded in ink;

- Corrections and additions to laboratory documents are made by drawing single lines through the errors, entering the correct information, and initialing and dating the new information;

- Unused portions of laboratory documents are lined-out;

- Pages in bound and unbound logbooks are sequentially numbered;

- Instrument-specific run logs are maintained to enable the reconstruction of run sequences;

- Logbook entries are recorded in chronological order;

- Entries are recorded for only one SDG per page, except in the event where SDGs "share" Quality Control (QC) samples (e.g., instrument run logs and extraction logs);

- Each page in bound and unbound logbooks shall be dated (month/day/year) and signed (no initials) at the bottom by the individual recording the activity (if a single entry is made on a page) or by the last individual recording information on the page (if multiple entries are on the same page);

- Information inserted in laboratory documents is affixed permanently, signed, and dated across the insert; and

- The retention or disposal of Government furnished samples, remaining portions of samples, and prepared samples is documented.

3.6 Computer-Resident Sample Data Control

3.6.1 The Contractor shall have written SOPs for computer-resident sample data control which accurately reflect the procedures used by the laboratory.

3.6.2 The written SOPs for computer-resident sample data control shall include the items listed below.

3.6.2.1 Procedures which ensure the following:

- Contractor personnel responsible for original data entry are identified;

- Changes to electronic data are made such that the original data entry is preserved, the editor is identified, and the revision date is recorded;

- The accuracy of manually entered data, electronically entered data, and data acquired from instruments is verified;

- Report documents produced by the electronic data collection system are routinely verified to ensure the accuracy of the information reported;

- Electronic data collection system security is maintained;

- Archives of electronic data and accompanying software are maintained in a secure location; and

- Off-site backup and storage of electronic data is maintained.

3.6.2.2 Descriptions of archive storage areas for the electronic data and the software required to access data archives.

3.6.2.3 A list of authorized personnel who have access to electronic data collection system functions and to archived data.

3.7 Complete Sample Delivery Group (SDG) File (CSF) Organization and Assembly

3.7.1 The Contractor shall have written SOPs for CSF organization and assembly which accurately reflect the procedures used by the laboratory.

3.7.2 The written SOPs for CSF organization and assembly shall ensure that the procedures listed below are in-use at the laboratory.

- Documents relating to the CSF are maintained in a secure location;
- All original laboratory forms and copies of SDG-related logbook pages are included in the CSF;
- Laboratory documents are photocopied in a manner to provide complete and legible replicates;
- All documents relevant to each SDG are included in the CSF;
- Sample tags are encased in clear plastic bags by the Document Control Officer or a designated representative before being placed in the CSF;
- The CSF is organized and assembled on an SDG-specific basis;
- Original documents that contain information relating to more than one SDG are filed in the CSF of the lowest SDG, and copies are referenced to originals in the event that an original document contains information relating to more than one SDG;
- Each CSF is submitted with a completed Form DC-2, and re-submitted CSFs are submitted with a new or revised Form DC-2;
- Each page of the CSF is stamped with a sequential number and the page number ranges are recorded in the columns provided on Form DC-2. Intentional gaps in the page numbering sequence are recorded in the "Comments" section of Form DC-2. Inserted documents are recorded in the "Other Records" section of Form DC-2;
- Consistency and completeness of the CSF are verified by the Document Control Officer or a designated representative;
- Shipments of deliverable packages are documented by the Document Control Officer or a designated representative;
- Deliverable packages are shipped by the Document Control Officer or a designated representative using custody seals in a manner such that opening the packages would break the seals; and
- Custody seals are signed and dated by the Document Control Officer or a designated representative before placing them on deliverable packages.

ATTACHMENT 7

SOW- EXHIBIT G - GLOSSARY OF TERMS

EXHIBIT G

GLOSSARY OF TERMS

ALIQUOT - A measured portion of a sample or solution, taken for sample preparation and/or analysis.

ANALYSIS DATE/TIME - The date and military time of the injection of the sample, standard, or blank into the High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS).

CALIBRATION STANDARD (CS) - A solution prepared from a secondary standard and/or stock solutions, and used to calibrate the response of the instrument with respect to analyte concentration.

CALIBRATION VERIFICATION STANDARD - The Mid-Point Calibration Standard (CS3) that is used to verify the initial calibration of the system.

CASE - A finite, usually predetermined, number of samples collected over a given time period from a particular site. Case numbers are assigned by the Government. A Case consists of one or more Sample Delivery Groups (SDGs).

CHAIN-OF-CUSTODY - A sample identification form filled out by the sampler, that accompanies the sample during shipment to the laboratory and that documents sample condition and receipt by the laboratory. Chain-of-Custody and Traffic Report are used interchangably throughout the Statement of Work.

CLEANUP STANDARD - A standard containing $^{37}Cl_4$-2,3,7,8-TCDD that is added to all extracts prior to cleanup. The purpose of this standard is to measure the efficiency of the cleanup process.

COLUMN PERFORMANCE SOLUTION (CPS) - When the Window Defining Mixture (WDM) and the Isomer Specificity Check solutions are combined, the solution is identified as the CPS.

CONGENER - Individual compound belonging to a group or class of compounds with a similar general structure.

CONTAMINATION - A component of a sample or an extract that is not representative of the environmental source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

DATE - MM/DD/YYYY - Where MM = 01 for January, 02 for February, ... 12 for December; DD = 01 to 31; YYYY = 1999, 2000, 2001, 2002, etc.

DAY - Unless otherwise specified, day shall mean calendar day.

ESTIMATED DETECTION LIMIT (EDL) - The concentration of an analyte required to produce a signal with peak height of at least 2.5 times the background signal level. The EDL is calculated for each 2,3,7,8-substituted isomer for which the response of the primary and secondary ions is less than 2.5 times the background level.

ESTIMATED MAXIMUM POSSIBLE CONCENTRATION (EMPC) - The EMPC is calculated for 2,3,7,8-substituted isomers for which the quantitation and/or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria.

EXTRACTABLE - A compound that can be partitioned into an organic solvent from the sample matrix, and is amenable to Gas Chromatography (GC).

GEL PERMEATION CHROMATOGRAPHY (GPC) - A size-exclusion chromatographic technique that is used as a cleanup procedure for removing large organic molecules, particularly naturally occurring macro-molecules such as lipids, polymers, viruses, etc.

HOMOLOGUE - A group of compounds that have the same molecular weight, but not necessarily the same structural arrangement.

HPLC - High Performance Liquid Chromatograph or High Performance Liquid Chromatography.

HRGC - High Resolution Gas Chromatograph or Gas Chromatography.

HRMS - High Resolution Mass Spectrometer or Mass Spectrometry.

IN-HOUSE - At the Contractor's facility.

INITIAL CALIBRATION - Analysis of analytical standards for a series of different specified concentrations. It is used to define the linearity and dynamic range of the response of the Mass Spectrometer (MS) to the target compounds.

INTEGRATION SCAN RANGE - Range from the scan number of the scan at the beginning of the area of integration to the scan number at the end of the area of integration.

INTEGRATION TIME RANGE - The Retention Time (RT) at the beginning of the area of integration to the RT at the end of the area of integration.

INTERNAL STANDARD - $^{13}C_{12}$-1,2,3,4-TCDD and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD standards are added to every blank, Quality Control (QC) sample, and sample extract aliquot just prior to analysis.

ISOMER - Chemical compounds that have the same molecular formula, but differ in structural arrangement and properties. For example, 1,2,3,4-TCDD and 2,3,7,8-TCDD are structural isomers.

LABELED COMPOUNDS - Isotopically labeled compounds in Exhibit D (see Table 1) that are added to every sample and are present at the same concentration in every blank, Quality Control (QC) sample, and calibration solution. The labeled compounds (internal standards) are added to the sample before extraction and are used to measure the concentrations of the analytes.

LABORATORY - Synonymous with Contractor, as used herein.

LABORATORY CONTROL SAMPLE (LCS) - Aliquot of a reference matrix fortified (spiked) with known quantities of specific compounds and subjected to the entire analytical procedure to determine the accuracy of the method by measuring recovery.

m/z - Mass-to-charge ratio, synonymous with “m/e”.

MATRIX - The predominant material of which the sample to be analyzed is composed. For the purpose of this Statement of Work (SOW), a sample matrix is either water, soil, sediment, sludge, tissue, ash, oil, or oily matrices. Matrix is <u>not</u> synonymous with phase (liquid or solid).

MATRIX EFFECT - In general, the effect of a particular matrix on the constituents with which it contacts. This is particularly pronounced for clay particles which may adsorb chemicals and catalyze reactions. Matrix effects may prevent extraction of target analytes. In addition, non-target analytes may be extracted from the matrix and cause interferences.

METHOD BLANK - An analytical control consisting of reference material, labeled compounds, internal standards, and cleanup standards, that is carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background, and reagent contamination.

NARRATIVE (SDG Narrative) - Portion of the data package which includes laboratory, contract, Case and sample number identification, and descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution. Complete Sample Delivery Group (SDG) Narrative specifications are included in Exhibit B.

PERCENT SOLIDS (%S) - An approximation of the dry solids content in a soil/sediment sample made by drying an aliquot of the sample for 12 hours at 110°C. The Percent Solids determined in this manner also excludes contributions from all compounds that may volatilize at or below 110°C. The Percent Solids is calculated as follows:

$$\text{\% Solids} = \frac{\textbf{Weight of Sample Aliquot After Drying}}{\textbf{Weight of Sample Aliquot Before Drying}} \times 100\%$$

PERFLUOROKEROSENE (PFK) - The mixture of compounds used to calibrate the exact m/z scale in the High Resolution Mass Spectrometer (HRMS).

PROTOCOL - Describes the exact procedures to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control. Used synonymously with Statement of Work (SOW).

REAGENT WATER - Water demonstrated to be free from the analytes of interest and potentially interfering substances.

RELATIVE PERCENT DIFFERENCE (RPD) - As used in this Statement of Work (SOW) and elsewhere to compare two values, the RPD is based on the mean of the two values, and is reported as an absolute value (i.e., always expressed as a positive number or zero).

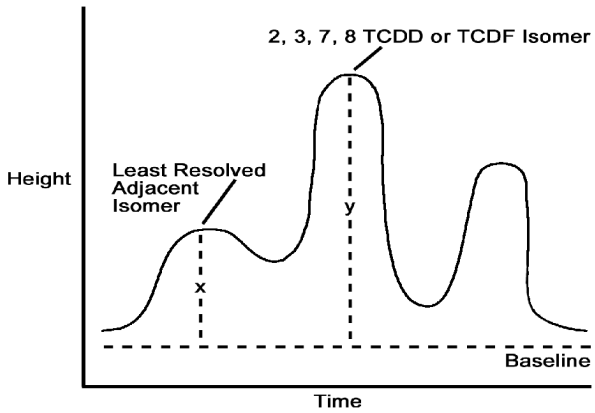
RELATIVE RESPONSE FACTOR (RRF) - The ratio of the response of a given compound to its corresponding internal standard. Response factors are determined using the area responses of both the primary and secondary exact m/z's for each compound in each calibration standard.

RELATIVE RESPONSE (RR) - A measure of the relative mass spectral response of the native compound compared to its labeled compound analog. RRs are determined using the area responses of both the primary and secondary exact m/z's for each compound in each calibration standard.

RELATIVE STANDARD DEVIATION (%RSD) - The standard deviation times 100, divided by the mean. Also termed Coefficient of Variation.

RESOLUTION - Also termed separation or Percent Resolution (%R), the separation between the least resolved adjacent isomer and the 2,3,7,8-TCDD or TCDF isomer, calculated by dividing the height of the 2,3,7,8-TCDD or TCDF isomer peak (y) by the height from the valley of the least resolved adjacent peak to the baseline (x), multiplied by 100.

RESPONSE or INSTRUMENTAL RESPONSE - A measurement of the output of the High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS) detector in which the intensity of the signal is proportionate to the amount (or concentration) detected. Measured by peak area or peak height.



RETENTION TIME (RT) - The time a target analyte is retained on a Gas Chromatograph (GC) column before elution. The identification of a target analyte is dependent on a target compound's retention time falling within the specified retention window established for that compound. The RT is dependent on the nature of the column's stationary phase, column diameter, temperature, flow rate, and other parameters.

SAMPLE - A portion of material to be analyzed

that is contained in single or multiple containers, and identified by a unique sample number.

SAMPLE DELIVERY GROUP (SDG) - A unit within a sample Case that is used to identify a group of samples for delivery. An SDG is defined by the following, whichever is most frequent:

- Each Case, if field samples received, or
- Each 20 field samples (excluding Performance Evaluation [PE] samples) within a Case, or
- Each 7 calendar day period during which field samples in a Case are received (said period beginning with the receipt of the first sample in the SDG).

In addition, all samples and/or sample fractions assigned to an SDG must have been scheduled under the same contractual turnaround time. Preliminary Results have no impact on defining the SDG.

Samples may be assigned to SDGs by matrix (e.g., all soil samples in one SDG, all water samples in another) at the discretion of the laboratory.

SAMPLE MANAGEMENT OFFICE (SMO) - A Contractor-operated facility operated under the Sample Management Office contract, awarded and administered by USEPA.

SAMPLE NUMBER (Designated sample number) - A unique identification number designated by the Government to each sample. The designated sample number appears on the sample Chain-of-Custody/Traffic Report which documents information on that sample.

SELECTED ION MONITORING (SIM) - A mode of Mass Spectrometry (MS) operation in which specific m/e ratios are monitored, as opposed to scanning the entire mass range.

SIGNAL TO NOISE (S/N) RATIO - The ratio of analyte signal to random background signal. The noise is defined as the height of the largest signal (excluding signal due to chlorinated dibenzo-p-dioxins/chlorinated dibenzofurans [CDDs/CDFs] or other chemicals) within the 100 scan window. The signal is defined as the height of the CDD/CDF peak.

SOIL - Used herein synonymously with soil/sediment, sediment, and sludge.

SOLID PHASE EXTRACTION (SPE) - An extraction technique in which an analyte is extracted from an aqueous sample by passage over or through a material capable of reversibly adsorbing the analyte. Also termed Liquid-Solid Extraction.

SOXHLET/DEAN-STARK EXTRACTOR (SDS) - An extraction device applied to the extraction of solid and semi-solid materials.

STOCK SOLUTION - A solution containing an analyte that is prepared using a reference material traceable to the USEPA, the National Institute of Science and Technology (NIST), or a source that will attest to the purity and authenticity of the reference material.

TARGET COMPOUND LIST (TCL) - A list of compounds designated by the Statement of Work (SOW) (See Exhibit C) for analysis.

TIME - When required to record time on any deliverable item, time shall be expressed in Military Time (i.e., a 24-hour clock).

TRAFFIC REPORT - A Govenrment furnished sample identification form filled out by the sampler, that accompanies the sample during shipment to the laboratory and that documents sample condition and receipt by the laboratory.

TOXICITY EQUIVALENCE FACTOR (TEF) - A coefficient relating the risks from a particular compound to another compound.

TWELVE-HOUR TIME PERIOD - For dioxin/furan analyses performed by High Resolution Gas Chromatography/High Resolution Mass Spectrometry (HRGC/HRMS), the 12-hour time period

in the analytical sequence begins at the moment of injection of the Window Defining Mixture (WDM) that precedes sample analyses, and ends after 12 hours have elapsed according to the system clock.

VALIDATED TIME OF SAMPLE RECEIPT (VTSR) - The date on which a sample is received at the Contractor's facility, as recorded on the shipper's delivery receipt and Sample Traffic Report.

WINDOW DEFINING MIXTURE (WDM) - Prior to analyzing the calibration solutions, blanks, samples, and Quality Control (QC) samples, the Retention Time (RT) WDM is analyzed to define the beginning RTs for the dioxin and furan isomers and evaluate descriptor switching times.

ATTACHMENT 8

SOW- EXHIBIT H - DATA DICTIONARY AND FORMAT FOR DATA DELIVERABLES IN COMPUTER-READABLE FORMAT

EXHIBIT H

DATA DICTIONARY AND FORMAT
FOR DATA DELIVERABLES IN
COMPUTER-READABLE FORMAT

Exhibit H - Data Dictionary and Format for Data Deliverables
in Computer-Readable Format

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1.0 ELECTRONIC DELIVERABLE FOR CHLORINATED DIBENZO-P-DIOXIN/DIBENZOFURAN (CDD/CDF) ANALYSIS

1.1 Requirements

The Contractor shall submit a diskette for CDD/CDF analysis.

1.1.1 The Analytical Operations Center is currently developing a data delivery strategy that may be used as an alternate to the requirements stated in Exhibit H. The Superfund Electronic Data Deliverable (SEDD) system is an Extensible Markup Language (XML)-based delivery system. Additional information on the SEDD system may be obtained from the following Web site at:

http://www.epa.gov/superfund/programs/clp/sedd.htm

This deliverable format may be required under specific task orders.

1.1.2 The file described below shall be submitted on IBM-compatible, 3.5 inch, high density 1.44 MB diskettes. The diskettes shall be formatted and recorded using DOS/Windows Operating Systems. The diskettes shall include all information relevant to one, and only one, Sample Delivery Group (SDG). Multiple diskettes may be submitted. The data from a single production run may be split onto multiple diskettes, however, do not split the data from a sample analysis onto multiple diskettes. Each diskette shall be identified with an external label containing the following information: disk density; Lab Code; contract number; Case number; SDG number; Task Order number; initial submission or resubmission, as applicable, and date.

1.1.3 The deliverable consists of a tab delimited text file containing the data elements listed in Section 1.2. The file must contain the fields in the order specified in Section 1.2 and the field names exactly as specified in Section 1.2. For specific field contents, and requirements for significant figures and number of decimal places, refer to Exhibit B of this Statement of Work (SOW). Information on the diskette must correspond to information submitted in the hardcopy raw data package and on the hardcopy raw data package forms. If the information submitted in the hardcopy data package forms is changed, the information in the electronic file (e.g., diskette) shall be changed accordingly, and a complete electronic deliverable containing all the information for the SDG shall be resubmitted along with the hardcopy at no additional cost to the Government. Report results for field samples, Performance Evaluation (PE) samples, method blanks, and Laboratory Control Samples (LCSs).

1.2 Required Fields

Field Name	**Data type**	**Format**	**Description**
Labname	Character string	Max length 25	Ex. B
Labcode	Character string	Max length 6	Ex. B
Contract	Character string	Max length 11	Ex. B
Case Number	Character string	Max length 5	Ex. B
SDG Number	Character string	Max length 20	Ex. B
T.O. Number	Character string	Max length 11	Ex. B
GC Column Identifier	Character string	Max length 12	GC Column (Ex. B)
GC Column Internal Diameter	Numeric	Max length 4	Ex. B (report in mm)

Field Name	**Data type**	**Format**	**Description**
Designated sample Number	Character string	Max length 20	The designated sample number per Ex. B.
Lab Sample ID	Character string	Max length 14	Ex. B
Lab File ID	Character string	Max length 14	Ex. B
Matrix	Character string	WATER, SOIL, TISSUE, OIL, ASH	The predominant material of which the sample is composed.
Date Received	Character string	YYYYMMDD	Laboratory Receipt Date. The date the sample was received at the laboratory.
Date Extracted	Character string	YYYYMMDD	The date sample extraction was begun.
Date Analyzed	Character string	YYYYMMDD	The date the sample was injected into the High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS).
Time Analyzed	Character string	HHMM	The time the sample was injected into the HRGC/HRMS.
Sample Weight/Volume	Numeric	Max length 6	Ex. D
Final Volume	Numeric	Max length 10	Concentrated extract volume.
Injection Volume	Numeric	Max length 10	Ex. B
Percent Solids/Lipids	Numeric	Max length 7	Ex. B
Dilution Factor	Numeric	Max length 10	Ex. B
CAS Number	Character string	Ex. C	The analyte being determined in an analysis.
Concentration	Numeric	Max length 13	Enter the value as it appears on the appropriate Form.
Concentration Units	Character string	PG/L, NG/KG	Ex. B
Concentration Qualifier	Character string	Max length 5	Concentration qualifier from Form I-CDD/CDF.

Field Name	**Data type**	**Format**	**Description**
EMPC	Numeric	Max length 13	Estimated Maximum Possible Concentration. Enter the value as it appears on the appropriate Form
Estimated Detection Limit	Numeric	Per Ex.B Form I-CDD/CDF	Ex. D
Amount Added	Numeric	Per Ex. B	For Laboratory Control Samples (LCSs).
Percent Recovery	Numeric	Per Ex. B	For LCS

1.2.1 Except for the Date Analyzed, Date Extracted, and Date Received fields, all fields should contain data exactly identical to that reported on the data forms for the package.

ATTACHMENT 9

WAGE DETERMINATION NO. 94-2433 REV. 20, DTD 7/5/01, OK, TULSA

FOR OFFICIAL USE ONLY BY FEDERAL AGENCIES PARTICIPATING IN MOU WITH DOL

WASHINGTON D.C. 20210

William W.Gross
Director

Division of
Wage Determinations

Wage Determination No.: 1994-2433
Revision No.: 20
Date Of Last Revision: 07/05/2001

State: **Oklahoma** Area: **Oklahoma** Counties of Adair, Cherokee, Choctaw, Craig, Creek, Delaware, Haskell, Kay, Latimer, Le Flore, Mayes, McCurtain, McIntosh, Muskogee, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Pittsburg, Pushmataha, Rogers, Sequoyah, Tulsa, Wagoner, Washington

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION TITLE	MINIMUM WAGE RATE
Administrative Support and Clerical Occupations	
Accounting Clerk I	10.11
Accounting Clerk II	10.68
Accounting Clerk III	13.94
Accounting Clerk IV	16.16
Court Reporter	12.46
Dispatcher, Motor Vehicle	13.35
Document Preparation Clerk	9.62
Duplicating Machine Operator	9.61
Film/Tape Librarian	10.35
General Clerk I	7.53
General Clerk II	8.92
General Clerk III	11.66
General Clerk IV	15.30
Housing Referral Assistant	14.78
Key Entry Operator I	8.28
Key Entry Operator II	9.04
Messenger (Courier)	10.24
Order Clerk I	10.26
Order Clerk II	12.44
Personnel Assistant (Employment) I	10.31
Personnel Assistant (Employment) II	11.57
Personnel Assistant (Employment) III	13.93
Personnel Assistant (Employment) IV	16.12
Production Control Clerk	14.55
Rental Clerk	10.61
Scheduler, Maintenance	10.61
Secretary I	10.61
Secretary II	12.77
Secretary III	14.78
Secretary IV	17.83
Secretary V	18.56
Service Order Dispatcher	11.09
Stenographer I	9.22
Stenographer II	10.35
Supply Technician	17.83
Survey Worker (Interviewer)	12.46
Switchboard Operator-Receptionist	8.62
Test Examiner	12.77
Test Proctor	12.77
Travel Clerk I	9.10
Travel Clerk II	9.56
Travel Clerk III	10.01
Word Processor I	9.18
Word Processor II	10.43
Word Processor III	11.69
Automatic Data Processing Occupations	
Computer Data Librarian	10.73
Computer Operator I	10.14
Computer Operator II	11.36
Computer Operator III	14.93
Computer Operator IV	17.36
Computer Operator V	19.23
Computer Programmer I (1)	15.49

Computer Programmer II (1)	19.14
Computer Programmer III (1)	23.56
Computer Programmer IV (1)	25.97
Computer Systems Analyst I (1)	21.10
Computer Systems Analyst II (1)	26.20
Computer Systems Analyst III (1)	27.62
Peripheral Equipment Operator	10.73
Automotive Service Occupations	
Automotive Body Repairer, Fiberglass	17.41
Automotive Glass Installer	15.67
Automotive Worker	15.67
Electrician, Automotive	16.54
Mobile Equipment Servicer	13.76
Motor Equipment Metal Mechanic	17.41
Motor Equipment Metal Worker	15.67
Motor Vehicle Mechanic	16.28
Motor Vehicle Mechanic Helper	12.71
Motor Vehicle Upholstery Worker	14.62
Motor Vehicle Wrecker	15.63
Painter, Automotive	16.56
Radiator Repair Specialist	15.67
Tire Repairer	13.29
Transmission Repair Specialist	17.41
Food Preparation and Service Occupations	
Baker	10.61
Cook I	9.35
Cook II	10.61
Dishwasher	6.62
Food Service Worker	6.57
Meat Cutter	10.61
Waiter/Waitress	7.23
Furniture Maintenance and Repair Occupations	
Electrostatic Spray Painter	16.54
Furniture Handler	10.62
Furniture Refinisher	16.54
Furniture Refinisher Helper	12.71
Furniture Repairer, Minor	14.62
Upholsterer	16.54
General Services and Support Occupations	
Cleaner, Vehicles	7.51
Elevator Operator	7.51
Gardener	10.40
House Keeping Aid I	6.42
House Keeping Aid II	7.51
Janitor	7.51
Laborer, Grounds Maintenance	8.04
Maid or Houseman	6.42
Pest Controller	11.50
Refuse Collector	9.28
Tractor Operator	9.60
Window Cleaner	8.31
Health Occupations	
Dental Assistant	10.93
Emergency Medical Technician (EMT)/Paramedic/Ambulance Driver	10.93
Licensed Practical Nurse I	10.02
Licensed Practical Nurse II	11.24
Licensed Practical Nurse III	12.57
Medical Assistant	9.97
Medical Laboratory Technician	10.30
Medical Record Clerk	9.77
Medical Record Technician	13.54
Nursing Assistant I	7.10
Nursing Assistant II	7.98
Nursing Assistant III	8.71
Nursing Assistant IV	9.77
Pharmacy Technician	12.18
Phlebotomist	11.24
Registered Nurse I	15.44
Registered Nurse II	18.89

Registered Nurse II, Specialist	18.89
Registered Nurse III	22.86
Registered Nurse III, Anesthetist	22.86
Registered Nurse IV	27.38
Information and Arts Occupations	
Audiovisual Librarian	17.38
Exhibits Specialist I	17.23
Exhibits Specialist II	20.23
Exhibits Specialist III	24.75
Illustrator I	17.23
Illustrator II	20.23
Illustrator III	24.75
Librarian	18.11
Library Technician	12.46
Photographer I	14.83
Photographer II	17.23
Photographer III	20.23
Photographer IV	24.75
Photographer V	29.95
Laundry, Dry Cleaning, Pressing and Related Occupations	
Assembler	6.43
Counter Attendant	6.43
Dry Cleaner	7.90
Finisher, Flatwork, Machine	6.43
Presser, Hand	6.43
Presser, Machine, Drycleaning	6.43
Presser, Machine, Shirts	6.43
Presser, Machine, Wearing Apparel, Laundry	6.43
Sewing Machine Operator	8.48
Tailor	9.39
Washer, Machine	6.94
Machine Tool Operation and Repair Occupations	
Machine-Tool Operator (Toolroom)	16.54
Tool and Die Maker	20.19
Material Handling and Packing Occupations	
Forklift Operator	12.82
Fuel Distribution System Operator	13.75
Material Coordinator	13.14
Material Expediter	13.14
Material Handling Laborer	10.67
Order Filler	11.01
Production Line Worker (Food Processing)	11.28
Shipping Packer	11.27
Shipping/Receiving Clerk	11.27
Stock Clerk (Shelf Stocker; Store Worker II)	11.37
Store Worker I	8.69
Tools and Parts Attendant	11.28
Warehouse Specialist	11.28
Mechanics and Maintenance and Repair Occupations	
Aircraft Mechanic	17.41
Aircraft Mechanic Helper	12.71
Aircraft Quality Control Inspector	18.28
Aircraft Servicer	14.62
Aircraft Worker	15.67
Appliance Mechanic	11.54
Bicycle Repairer	13.29
Cable Splicer	18.08
Carpenter, Maintenance	16.54
Carpet Layer	15.67
Electrician, Maintenance	21.97
Electronics Technician, Maintenance I	17.77
Electronics Technician, Maintenance II	22.20
Electronics Technician, Maintenance III	23.38
Fabric Worker	14.62
Fire Alarm System Mechanic	17.41
Fire Extinguisher Repairer	13.76
Fuel Distribution System Mechanic	17.41
General Maintenance Worker	14.49
Heating, Refrigeration and Air Conditioning Mechanic	17.41

Heavy Equipment Mechanic	17.41
Heavy Equipment Operator	17.41
Instrument Mechanic	18.60
Laborer	6.92
Locksmith	16.54
Machinery Maintenance Mechanic	16.01
Machinist, Maintenance	17.41
Maintenance Trades Helper	12.71
Millwright	17.41
Office Appliance Repairer	16.54
Painter, Aircraft	16.54
Painter, Maintenance	16.48
Pipefitter, Maintenance	17.41
Plumber, Maintenance	16.54
Pneudraulic Systems Mechanic	17.41
Rigger	17.41
Scale Mechanic	15.67
Sheet-Metal Worker, Maintenance	17.41
Small Engine Mechanic	15.67
Telecommunication Mechanic I	17.41
Telecommunication Mechanic II	18.30
Telephone Lineman	17.41
Welder, Combination, Maintenance	17.41
Well Driller	17.41
Woodcraft Worker	17.41
Woodworker	13.76
Miscellaneous Occupations	
Animal Caretaker	7.94
Carnival Equipment Operator	8.63
Carnival Equipment Repairer	9.35
Carnival Worker	6.53
Cashier	7.60
Desk Clerk	9.29
Embalmer	16.57
Lifeguard	9.02
Mortician	16.57
Park Attendant (Aide)	11.32
Photofinishing Worker (Photo Lab Tech., Darkroom Tech)	8.28
Recreation Specialist	12.88
Recycling Worker	8.63
Sales Clerk	9.52
School Crossing Guard (Crosswalk Attendant)	6.53
Sport Official	9.02
Survey Party Chief (Chief of Party)	16.49
Surveying Aide	9.74
Surveying Technician (Instr. Person/Surveyor Asst./Instr.)	14.10
Swimming Pool Operator	10.61
Vending Machine Attendant	8.63
Vending Machine Repairer	10.61
Vending Machine Repairer Helper	8.63
Personal Needs Occupations	
Child Care Attendant	9.29
Child Care Center Clerk	11.88
Chore Aid	6.70
Homemaker	14.81
Plant and System Operation Occupations	
Boiler Tender	17.41
Sewage Plant Operator	16.54
Stationary Engineer	17.41
Ventilation Equipment Tender	12.71
Water Treatment Plant Operator	16.54
Protective Service Occupations	
Alarm Monitor	9.60
Corrections Officer	11.45
Court Security Officer	12.04
Detention Officer	11.45
Firefighter	11.58
Guard I	7.14
Guard II	11.04

Police Officer	14.39
Stevedoring/Longshoremen Occupations	
Blocker and Bracer	13.67
Hatch Tender	13.67
Line Handler	13.67
Stevedore I	12.89
Stevedore II	14.46
Technical Occupations	
Air Traffic Control Specialist, Center (2)	27.00
Air Traffic Control Specialist, Station (2)	18.62
Air Traffic Control Specialist, Terminal (2)	20.50
Archeological Technician I	16.79
Archeological Technician II	18.79
Archeological Technician III	23.26
Cartographic Technician	20.23
Civil Engineering Technician	20.23
Computer Based Training (CBT) Specialist/ Instructor	23.23
Drafter I	11.87
Drafter II	15.58
Drafter III	18.22
Drafter IV	21.39
Engineering Technician I	21.39
Engineering Technician II	16.31
Engineering Technician III	17.71
Engineering Technician IV	21.94
Engineering Technician V	26.73
Engineering Technician VI	32.34
Environmental Technician	16.69
Flight Simulator/Instructor (Pilot)	23.37
Graphic Artist	18.82
Instructor	18.82
Laboratory Technician	14.45
Mathematical Technician	20.23
Paralegal/Legal Assistant I	12.47
Paralegal/Legal Assistant II	15.56
Paralegal/Legal Assistant III	16.10
Paralegal/Legal Assistant IV	23.04
Photooptics Technician	20.23
Technical Writer	20.62
Unexploded (UXO) Safety Escort	17.16
Unexploded (UXO) Sweep Personnel	17.16
Unexploded Ordnance (UXO) Technician I	17.16
Unexploded Ordnance (UXO) Technician II	20.76
Unexploded Ordnance (UXO) Technician III	24.88
Weather Observer, Combined Upper Air and Surface Programs (3)	16.50
Weather Observer, Senior (3)	18.33
Weather Observer, Upper Air (3)	16.50
Transportation/ Mobile Equipment Operation Occupations	
Bus Driver	10.56
Parking and Lot Attendant	6.96
Shuttle Bus Driver	9.91
Taxi Driver	9.16
Truckdriver, Heavy Truck	13.69
Truckdriver, Light Truck	9.91
Truckdriver, Medium Truck	10.67
Truckdriver, Tractor-Trailer	14.02

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS: HEALTH & WELFARE: $2.02 an hour or $80.80 a week or $350.13 a month. VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173) HOLIDAYS: A minimum of ten paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4.174) THE OCCUPATIONS WHICH HAVE PARENTHESES AFTER THEM RECEIVE THE

FOLLOWING BENEFITS (as numbered): 1) Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See CFR 4.156) 2) APPLICABLE TO AIR TRAFFIC CONTROLLERS ONLY - NIGHT DIFFERENTIAL: An employee is entitled to pay for all work performed between the hours of 6:00 P.M. and 6:00 A.M. at the rate of basic pay plus a night pay differential amounting to 10 percent of the rate of basic pay. 3) WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY: If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work). HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry- house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges. A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordance, explosives, and incendiary material differential pay. ** UNIFORM ALLOWANCE ** If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance: The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of $3.35 per week (or $.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs. ** NOTES APPLYING TO THIS WAGE DETERMINATION ** Source of Occupational Title and Descriptions: The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fourth Edition, January 1993, as amended by the Third Supplement, dated March 1997, unless otherwise indicated. This publication may be obtained from the Superintendent of Documents, at 202-783-3238, or by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Copies of specific job descriptions may also be obtained from the appropriate contracting officer. REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)} Conformance Process: The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es)

of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed. The process for preparing a conformance request is as follows: 1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s). 2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work. 3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4). 4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request. 5) The contracting officer transmits the Wage and Hour decision to the contractor. 6) The contractor informs the affected employees. Information required by the Regulations must be submitted on SF 1444 or bond paper. When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

ATTACHMENT 10

WAGE DETERMINATION NO. 94-2058 REV. 22, DTD 8/13/01, CA, SAN DIEGO

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION TITLE	MINIMUM WAGE RATE
Administrative Support and Clerical Occupations	
Accounting Clerk I	10.27
Accounting Clerk II	11.20
Accounting Clerk III	13.08
Accounting Clerk IV	16.26
Court Reporter	15.05
Dispatcher, Motor Vehicle	13.88
Document Preparation Clerk	10.59
Duplicating Machine Operator	10.59
Film/Tape Librarian	12.74
General Clerk I	7.56
General Clerk II	8.49
General Clerk III	11.15
General Clerk IV	13.40
Housing Referral Assistant	17.26
Key Entry Operator I	9.96
Key Entry Operator II	11.30
Messenger (Courier)	8.97
Order Clerk I	10.93
Order Clerk II	13.63
Personnel Assistant (Employment) I	12.09
Personnel Assistant (Employment) II	14.09
Personnel Assistant (Employment) III	15.53
Personnel Assistant (Employment) IV	18.16
Production Control Clerk	15.36
Rental Clerk	11.91
Scheduler, Maintenance	11.91
Secretary I	11.91
Secretary II	13.18
Secretary III	17.26
Secretary IV	19.52
Secretary V	23.06
Service Order Dispatcher	12.74
Stenographer I	11.52
Stenographer II	12.95
Supply Technician	19.52
Survey Worker (Interviewer)	13.05
Switchboard Operator-Receptionist	10.57
Test Examiner	13.18
Test Proctor	13.18
Travel Clerk I	9.33
Travel Clerk II	10.20
Travel Clerk III	11.20
Word Processor I	11.71
Word Processor II	14.40
Word Processor III	17.55
Automatic Data Processing Occupations	
Computer Data Librarian	10.70
Computer Operator I	11.46
Computer Operator II	12.83
Computer Operator III	15.39
Computer Operator IV	18.54
Computer Operator V	20.52
Computer Programmer I (1)	16.26
Computer Programmer II (1)	20.15
Computer Programmer III (1)	26.33
Computer Programmer IV (1)	27.62

Computer Systems Analyst I (1)	24.83
Computer Systems Analyst II (1)	27.62
Computer Systems Analyst III (1)	27.62
Peripheral Equipment Operator	12.53
Automotive Service Occupations	
Automotive Body Repairer, Fiberglass	18.76
Automotive Glass Installer	17.45
Automotive Worker	17.45
Electrician, Automotive	18.13
Mobile Equipment Servicer	16.06
Motor Equipment Metal Mechanic	18.76
Motor Equipment Metal Worker	17.45
Motor Vehicle Mechanic	18.43
Motor Vehicle Mechanic Helper	15.06
Motor Vehicle Upholstery Worker	16.81
Motor Vehicle Wrecker	17.45
Painter, Automotive	18.13
Radiator Repair Specialist	17.45
Tire Repairer	15.52
Transmission Repair Specialist	18.76
Food Preparation and Service Occupations	
Baker	12.00
Cook I	11.04
Cook II	12.00
Dishwasher	8.28
Food Service Worker	8.28
Meat Cutter	12.97
Waiter/Waitress	8.96
Furniture Maintenance and Repair Occupations	
Electrostatic Spray Painter	18.13
Furniture Handler	13.02
Furniture Refinisher	18.13
Furniture Refinisher Helper	15.06
Furniture Repairer, Minor	16.81
Upholsterer	18.13
General Services and Support Occupations	
Cleaner, Vehicles	9.52
Elevator Operator	8.28
Gardener	11.04
House Keeping Aid I	7.59
House Keeping Aid II	8.38
Janitor	8.38
Laborer, Grounds Maintenance	8.96
Maid or Houseman	7.58
Pest Controller	11.56
Refuse Collector	9.52
Tractor Operator	10.36
Window Cleaner	9.08
Health Occupations	
Dental Assistant	13.28
Emergency Medical Technician (EMT)/Paramedic/Ambulance Driver	11.15
Licensed Practical Nurse I	11.25
Licensed Practical Nurse II	12.63
Licensed Practical Nurse III	14.15
Medical Assistant	9.75
Medical Laboratory Technician	12.54
Medical Record Clerk	12.63
Medical Record Technician	13.25
Nursing Assistant I	7.65
Nursing Assistant II	8.66
Nursing Assistant III	9.38
Nursing Assistant IV	10.55
Pharmacy Technician	12.01
Phlebotomist	11.89
Registered Nurse I	21.00
Registered Nurse II	24.74
Registered Nurse II, Specialist	24.74
Registered Nurse III	29.39
Registered Nurse III, Anesthetist	29.39

Registered Nurse IV	35.22
Information and Arts Occupations	
Audiovisual Librarian	19.52
Exhibits Specialist I	16.76
Exhibits Specialist II	19.53
Exhibits Specialist III	23.89
Illustrator I	16.83
Illustrator II	19.60
Illustrator III	23.99
Librarian	23.06
Library Technician	13.14
Photographer I	13.02
Photographer II	16.76
Photographer III	19.53
Photographer IV	23.89
Photographer V	28.91
Laundry, Dry Cleaning, Pressing and Related Occupations	
Assembler	6.88
Counter Attendant	6.88
Dry Cleaner	8.51
Finisher, Flatwork, Machine	6.88
Presser, Hand	6.88
Presser, Machine, Drycleaning	6.88
Presser, Machine, Shirts	6.88
Presser, Machine, Wearing Apparel, Laundry	6.88
Sewing Machine Operator	9.06
Tailor	10.10
Washer, Machine	7.30
Machine Tool Operation and Repair Occupations	
Machine-Tool Operator (Toolroom)	18.13
Tool and Die Maker	22.25
Material Handling and Packing Occupations	
Forklift Operator	13.28
Fuel Distribution System Operator	16.06
Material Coordinator	12.82
Material Expediter	12.82
Material Handling Laborer	9.82
Order Filler	10.08
Production Line Worker (Food Processing)	11.50
Shipping Packer	10.78
Shipping/Receiving Clerk	10.78
Stock Clerk (Shelf Stocker; Store Worker II)	11.90
Store Worker I	9.45
Tools and Parts Attendant	11.77
Warehouse Specialist	11.77
Mechanics and Maintenance and Repair Occupations	
Aircraft Mechanic	18.76
Aircraft Mechanic Helper	15.06
Aircraft Quality Control Inspector	21.25
Aircraft Servicer	16.81
Aircraft Worker	17.45
Appliance Mechanic	18.13
Bicycle Repairer	15.52
Cable Splicer	21.57
Carpenter, Maintenance	18.13
Carpet Layer	17.45
Electrician, Maintenance	19.95
Electronics Technician, Maintenance I	11.76
Electronics Technician, Maintenance II	18.80
Electronics Technician, Maintenance III	22.52
Fabric Worker	16.81
Fire Alarm System Mechanic	18.76
Fire Extinguisher Repairer	16.06
Fuel Distribution System Mechanic	18.76
General Maintenance Worker	17.45
Heating, Refrigeration and Air Conditioning Mechanic	18.76
Heavy Equipment Mechanic	20.37
Heavy Equipment Operator	22.87
Instrument Mechanic	19.30

Laborer	10.95
Locksmith	18.13
Machinery Maintenance Mechanic	22.42
Machinist, Maintenance	18.96
Maintenance Trades Helper	15.06
Millwright	20.04
Office Appliance Repairer	18.13
Painter, Aircraft	18.13
Painter, Maintenance	18.13
Pipefitter, Maintenance	18.76
Plumber, Maintenance	18.13
Pneudraulic Systems Mechanic	18.76
Rigger	18.76
Scale Mechanic	17.45
Sheet-Metal Worker, Maintenance	18.76
Small Engine Mechanic	17.45
Telecommunication Mechanic I	18.76
Telecommunication Mechanic II	21.75
Telephone Lineman	18.76
Welder, Combination, Maintenance	18.76
Well Driller	19.74
Woodcraft Worker	18.76
Woodworker	16.06
Miscellaneous Occupations	
Animal Caretaker	9.66
Carnival Equipment Operator	11.56
Carnival Equipment Repairer	12.32
Carnival Worker	8.28
Cashier	9.99
Desk Clerk	10.06
Embalmer	19.62
Lifeguard	9.32
Mortician	19.62
Park Attendant (Aide)	11.71
Photofinishing Worker (Photo Lab Tech., Darkroom Tech)	11.63
Recreation Specialist	13.95
Recycling Worker	11.95
Sales Clerk	9.58
School Crossing Guard (Crosswalk Attendant)	8.28
Sport Official	9.20
Survey Party Chief (Chief of Party)	21.91
Surveying Aide	14.31
Surveying Technician (Instr. Person/Surveyor Asst./Instr.)	19.92
Swimming Pool Operator	12.00
Vending Machine Attendant	11.31
Vending Machine Repairer	13.09
Vending Machine Repairer Helper	10.92
Personal Needs Occupations	
Child Care Attendant	8.07
Child Care Center Clerk	11.26
Chore Aid	9.19
Homemaker	14.12
Plant and System Operation Occupations	
Boiler Tender	18.76
Sewage Plant Operator	19.63
Stationary Engineer	20.31
Ventilation Equipment Tender	15.06
Water Treatment Plant Operator	19.63
Protective Service Occupations	
Alarm Monitor	16.41
Corrections Officer	19.09
Court Security Officer	21.07
Detention Officer	21.07
Firefighter	18.83
Guard I	8.43
Guard II	16.10
Police Officer	23.30
Stevedoring/Longshoremen Occupations	
Blocker and Bracer	15.33

Hatch Tender	13.33
Line Handler	13.33
Stevedore I	14.76
Stevedore II	16.52
Technical Occupations	
Air Traffic Control Specialist, Center (2)	27.91
Air Traffic Control Specialist, Station (2)	19.25
Air Traffic Control Specialist, Terminal (2)	21.19
Archeological Technician I	15.61
Archeological Technician II	17.46
Archeological Technician III	21.64
Cartographic Technician	22.77
Civil Engineering Technician	22.87
Computer Based Training (CBT) Specialist/ Instructor	21.59
Drafter I	12.13
Drafter II	13.62
Drafter III	17.52
Drafter IV	20.42
Engineering Technician I	13.88
Engineering Technician II	15.58
Engineering Technician III	18.76
Engineering Technician IV	22.85
Engineering Technician V	27.83
Engineering Technician VI	33.69
Environmental Technician	18.18
Flight Simulator/Instructor (Pilot)	26.51
Graphic Artist	20.28
Instructor	21.59
Laboratory Technician	15.10
Mathematical Technician	19.44
Paralegal/Legal Assistant I	17.86
Paralegal/Legal Assistant II	22.39
Paralegal/Legal Assistant III	27.39
Paralegal/Legal Assistant IV	33.13
Photooptics Technician	19.93
Technical Writer	25.34
Unexploded (UXO) Safety Escort	18.33
Unexploded (UXO) Sweep Personnel	18.33
Unexploded Ordnance (UXO) Technician I	18.33
Unexploded Ordnance (UXO) Technician II	22.17
Unexploded Ordnance (UXO) Technician III	26.58
Weather Observer, Combined Upper Air and Surface Programs (3)	15.82
Weather Observer, Senior (3)	17.56
Weather Observer, Upper Air (3)	15.82
Transportation/ Mobile Equipment Operation Occupations	
Bus Driver	13.05
Parking and Lot Attendant	6.91
Shuttle Bus Driver	9.61
Taxi Driver	7.85
Truckdriver, Heavy Truck	14.33
Truckdriver, Light Truck	9.61
Truckdriver, Medium Truck	13.41
Truckdriver, Tractor-Trailer	14.33

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS: HEALTH & WELFARE: Life, accident, and health insurance plans, sick leave, pension plans, civic and personal leave, severance pay, and savings and thrift plans. Minimum employer contributions costing an average of $2.56 per hour computed on the basis of all hours worked by service employees employed on the contract. VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173) HOLIDAYS: A minimum of ten paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4.174) THE OCCUPATIONS WHICH HAVE PARENTHESES AFTER THEM RECEIVE THE

FOLLOWING BENEFITS (as numbered): 1) Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See CFR 4.156) 2) APPLICABLE TO AIR TRAFFIC CONTROLLERS ONLY - NIGHT DIFFERENTIAL: An employee is entitled to pay for all work performed between the hours of 6:00 P.M. and 6:00 A.M. at the rate of basic pay plus a night pay differential amounting to 10 percent of the rate of basic pay. 3) WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY: If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work). HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry- house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges. A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordance, explosives, and incendiary material differential pay. ** UNIFORM ALLOWANCE ** If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance: The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of $3.35 per week (or $.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs. ** NOTES APPLYING TO THIS WAGE DETERMINATION ** Source of Occupational Title and Descriptions: The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fourth Edition, January 1993, as amended by the Third Supplement, dated March 1997, unless otherwise indicated. This publication may be obtained from the Superintendent of Documents, at 202-783-3238, or by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Copies of specific job descriptions may also be obtained from the appropriate contracting officer. REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)} Conformance Process: The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of

contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed. The process for preparing a conformance request is as follows: 1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s). 2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work. 3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4). 4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request. 5) The contracting officer transmits the Wage and Hour decision to the contractor. 6) The contractor informs the affected employees. Information required by the Regulations must be submitted on SF 1444 or bond paper. When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

ATTACHMENT 11

CLIENT AUTHORIZATION LETTER - PAST PERFORMANCE QUESTIONNAIRE

Client Authorization Letter

[Addressee]

Dear "Client":

We are currently responding to the Environmental Protection Agency's RFP No. PR-HQ-00-11943 for Analysis of Chlorinated Dibenzo-P-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs). The EPA is placing increased emphasis in their acquisitions on past performance as a source selection factor.

EPA has asked each offeror to send Past Performance Questionnaires to its customers to complete and send to the Contracting Officer. Please complete the attached Past Performance Questionnaire and mail to U.S. EPA, Attn: B.Stearrett (MD-3805R), 1200 Pennsylvania Ave. NW, Washington DC 20460, by September 28, 2001.

If you are contacted by EPA for information on work we have performed under contract for your company or for clarification of your responses to the questionnaire, you are hereby authorized to respond to EPA inquiries.

Your cooperation is appreciated. Any questions may be directed to _____.

Sincerely,

PAST PERFORMANCE QUESTIONNAIRE

S O U R C E S E L E C T I O N S E N S I T I V E I N F O R M A T I O N

(TO BE COMPLETED BY OFFEROR PRIOR TO MAILING TO REFERENCE)

Name of Offeror:
Contract Number:
Contract Title:

Contract Value:

___Type of Contract:
Period of Performance:

The remainder of this form is to be completed by the reference and returned to EPA as instructed in the Client Authorization Letter.

Performance Elements	Not Applicable	Outstanding	Satisfactory	Unsatisfactory
1. Quality of Product or Service				
2. Timeliness of Performance				
3. Cost Control (including accuracy of cost estimating)				
4. Effectiveness of Management(including subcontractors)				
5. Initiative in Meeting Requirements				
6. Response to Technical Direction				
7. Responsiveness to Performance Problems				
8. Customer Satisfaction				
9. Overall Performance				

9. Remarks on outstanding performance:
(Provide data supporting this observation; you may continue on a separate sheet if needed.)

10. Remarks on unsatisfactory performance:
(Provide data supporting this observation; you may continue on separate sheet if needed.)

11. Please identify any corporate affiliations with the offeror.

12. Would you do business with this firm again?

13. Information provided by:

Agency/Firm

Name

Title

Mailing Address (Street and P.O. Box)

City, State and Zip Code

Telephone and Fax Numbers