

The final data for GC/MS semivolatiles and volatiles analyses are calculated by the computer data acquisition system attached to each mass spectrometer.

QC acceptance criteria (Section 5.0) for the relative percent difference of replicate matrix spike recoveries and for the range of acceptable recoveries are electronically stored for each STORET number/method code combination. If the samples in a batch (sample lot) do not pass all the QC checks (Section 11.0), then the results reported in all samples processed in the same sample set may be considered as suspect and the analyses may need to be repeated.

Completed batch folders are stored in a secured central location arranged by departments and numerically by batch number. Strip charts, chromatograms, copies of parameter notebooks, and all other pertinent raw data and other documentation will be stored in the batch folders.

Once the data set is complete for each sampling effort, the Laboratory Coordinator organizes the information in final reports appropriate to project requirements. This Laboratory Coordinator is responsible for final QC review and release of the data.

## 12.1.1 THE DOCUMENTATION RECORDS

### 12.1.1.1 GC/HPLC

Prior to analysis, the analyst must obtain a file folder and all applicable logsheets and data sheets.

Extraction Logsheets--An extraction logsheet (Figure 7-14), filled out by the analyst performing the sample extraction, will accompany each lot of samples throughout analysis. This sheet will include at least the following data:

1. Project name and number.
2. Extractor's initials.
3. Type of sample matrix.

4. Field group name.
5. Sample numbers.
6. Date extracted.
7. Analyte group [e.g., pentachlorophenol (PCP), PAHs, OCPs].
8. Initial volume or wet weight of sample extracted.
9. Initial/final pH (water sample).
10. Extracting solvent.
11. Final volume/solvent.
12. Lot number(s) of solvent(s) used.
13. Date of cleanup (if required).
14. Notes and comments affecting the extraction procedure, and
15. Appearance of each sample.

After extraction is complete, extraction logsheets will be filed in the batch folder and accompany the extracted samples to the instrumental analyst. Each extract vial will be properly labeled and include the following information:

1. Project name.
2. Field group name.
3. Sample number.
4. Extraction concentration factor.
5. Date extracted, and
6. Extractor's initials.

Instrument Logbooks--During analysis, the following information will be recorded in the instrument notebook:

1. A log of the types of analyses run on the instrument, to include:
  - a. Column conditions and temperature zones.
  - b. Sample numbers or other identification of samples.
  - c. Reference to a method describing the analysis.
  - d. Analysis date.

- e. Detector used [e.g., flame ionization detector (FID)], and
  - f. Detector conditions.
2. Service records, which are kept in a separate maintenance log.

Chromatograms--At the time of analysis, the analyst will include on the chromatogram the following information:

1. Date and time of analysis.
2. Analyst's initials.
3. Instrument used.
4. Field group name.
5. Sample number and other identification for each chromatogram, and
6. Concentration/dilution factor for each sample.

The chromatograms, extraction logsheet, and copies of instrument logbooks will be placed in the batch file folder.

Chromatographic Logsheets--For each analysis, the analyst will record all pertinent information on a standard curve data sheet and chromatographic data logsheet. The standard curve data sheet lists the standards, their concentrations, and the respective responses. The chromatographic data sheet lists the samples in order of injection and the factors needed for calculating the concentrations. A sample calculation using calculated response factors will appear on the back of the chromatographic data sheet if responses are calculated manually.

After the analysis and data reduction are complete, the chromatograms and worksheets will be stored in the batch file folder and the data entered into CLASS<sup>TM</sup>. The folder will be turned in to Laboratory Information Services for processing and storage in the secured central filing location.

Standards--Prior to analysis, stock standard solutions and working solutions covering the working range of the method will be prepared. Procedures used in preparing the standards will be recorded in the standards preparation notebook. The following information must be recorded:

1. Reference standard source.
2. Lot number.
3. Date of preparation.
4. Analyst's name or initials.
5. Actual weight measured.
6. Volumetric flask volume.
7. Calculated concentration.
8. Solvent name and lot number.
9. Dilutions, and
10. Expiration date.

Immediately after an analytical standard has been prepared, the standard will be transferred to an amber glass vial or bottle and properly labeled. Standards should be refrigerated when not in immediate use.

#### 12.1.1.2 GC/MS

Prior to analysis, the extracting analyst must obtain a batch file folder and all applicable data sheets and logsheets.

Extraction Logsheets--Once a batch has been established, the sample extraction and analysis procedure begins. A GC/MS extraction logsheet (Figure 7-14), filled out by the analyst performing the sample extraction, will accompany the batch throughout analysis.

This sheet will include at least the following data:

1. Project name and number.
2. Analyst's initials.
3. Type of sample matrix.

4. Field group name.
5. Sample numbers.
6. Date extracted.
7. Analyte group (i.e., acids, base/neutral),
8. Initial volume or wet weight of sample extracted.
9. Initial/final pH.
10. Extract solvent.
11. Final volume/solvent.
12. Lot number(s) of solvent(s) used.
13. Date of cleanup, and
14. Notes and comments affecting the extraction procedure.

After extraction, extraction logsheets will be filed in the batch file folder and accompany the extracted samples to the instrument analyst. The extract vial will be properly labeled. The label will contain the following information:

1. Project name.
2. Field group.
3. Sample number.
4. Extraction concentration factor and solvent used.
5. Date extracted, and
6. Extractor's initials.

Sample Screening--Sample extracts may be screened by GC employing flame ionization detection (GC/FID) prior to GC/MS analysis to permit dilution of extracts (as required) to concentration levels compatible with the GC/MS instrument and column capabilities.

Spectral Data and GC/MS Computer Quantitation Report--The quantitative sample and standard data generated by the GC/MS data system and all mass spectral information will be labeled according to EPA-CLP 2/88 SOW and placed in the batch file folder. Manual data reduction sheets also will be placed in this folder.

Standards--Prior to analysis, stock standard solutions and working solutions covering the working range of the instrument are prepared. Procedures used in preparing the standards must be recorded in the preparer's laboratory notebook. The following information will be recorded:

1. Reference standard source.
2. Lot number.
3. Date of preparation.
4. Analyst's name or initials.
5. Actual weight (or volume) measured.
6. Volumetric flask volume.
7. Calculated concentration.
8. Solvent name and lot number, and
9. Dilutions.

The analytical standard will be transferred immediately to a properly labeled glass amber bottle or vial after preparation. Standards should be refrigerated when not in use.

GC/MS Instrument Logbooks--Whenever the GC/MS is used for sample analysis, the following information will be recorded in an instrument logbook:

1. Instrument conditions of the gas chromatograph.
2. Instrument conditions of the mass spectrometer.
3. Analyst's initials.
4. Date of analysis.
5. Sample number.
6. Dilution factor, and
7. Frame reference number (FRN).

Compound Identification--Compound identification will be made in terms of the full-scan mass spectrum obtained in the electron impact mode at 70 electronvolts (eV). Compound identification will require the presence of all significant major ions at the appropriate

relative abundance as obtained with an authentic compound or reference spectrum from a reputable literature source. The selection of significant ions is strongly compound dependent, and because of this and other considerations, the identification of compounds will entail considerable professional judgment and experience.

The most convincing evidence for compound identification is comparison of spectrum with that of an authentic compound obtained under identical operation conditions. When this is not possible due to compound availability, computer identification or manual library search will be used.

When no tentative matches are found in the library, identification will be based on application of known fragmentation patterns, empirical correlations, and isotope abundance data. All data reported as a result of library searches will be reported as tentatively identified compounds (TICs).

Compound Quantification--The technique of extracted ion current profiles will be employed for the preliminary qualitative searching and for quantification of individual compounds. Appropriate internal standards will be employed to permit quantification in terms of the relative response to these internal standards. Concentration calculations and data reduction procedures are given in Section 10.1.

Spiking with Internal Standards--All samples will be spiked with quantitation standards just prior to the GC/MS analysis (Section 11.2). Appropriate internal standards will be selected for the remaining categories.

GC/MS Instrumental Detection Limits--The instrumental detection limit refers to the least quantity of material required to provide a total mass spectrum of sufficient quantity to permit compound identification. The mass spectrum must contain all major ions with the appropriate relative abundance within 20 percent of either an authentic compound

analyzed under identical conditions or an appropriate reference spectrum from the literature.

Data Management--Output from the gas chromatography/mass spectrometry/ data system (GC/MS/DS) is variable, depending on the project. However, all raw data such as mass chromatograms will be stored on magnetic tape. The final results are transmitted to CLASS™ by project and sample number. Quantification reports present the calculation results. The FRN is obtained from the quantification reports. All magnetic tapes are kept in sequential order with respect to the FRN. By following this sequence, it is possible to obtain all raw data for a particular sample number. The GC/MS computer generates a data file that is transmitted to CLASS™. Laboratory Information Services personnel process the transmitted data and generate a batch report. The batch is returned to the analyst for review. The batch folder, containing the quantification report, batch report, copies of logsheets, and other pertinent raw data is turned into Laboratory Information Services for processing and storage in the secured central filing location.

#### 12.1.1.3 Trace Metals

Prior to analysis, the analyst must obtain a file folder and all applicable logsheets and data sheets.

Digestion or Sample Preparation Logsheet--A digestion or sample preparation logsheet, filled out by the analyst performing the sample digestion or sample preparation, will accompany each lot of samples throughout the analysis. This logsheet will include the following data:

1. Method used (GFAA, CVAA, ICAP)
2. Analyst's initials.
3. Date sample digested.
4. Initial volume or weight.
5. Final volume.
6. Spiking solution used and date spiking solution prepared.

7. Field Group.
8. Sample numbers, and
9. Notes or comments affecting the digestion procedure.

Strip Charts--At the time of analysis (currently only applicable to mercury by cold vapor), the following information will be recorded on the strip chart:

1. Analyst's name, initials, or employee number;
2. Date of analysis;
3. Instrument/method used;
4. Element of interest;
5. Instrument conditions;
6. Sample matrix; and
7. Comments.

During analysis, the analyst will indicate on the strip chart sample numbers, QC samples, blanks, and standards.

After the data have been reduced and recorded in the instrument notebook, the strip charts are placed in a batch file folder together with the copies of the digestion logsheet, copies of the instrument logbook, and reduction sheets. These data are entered manually or automatically uploaded to CLASS™ to generate a uniquely numbered batch. The analyst reviews the data and validates the correct transcription of data into CLASS™. Then, the batch is signed and submitted to Laboratory Information Services to be stored in the secured central filing system.

For ICAP, the ICAP computer produces a data file that is evaluated and transmitted to CLASS™. The analyst then generates a batch for review. The batch folder containing the batch report, the data file, copies of logsheets, and all other pertinent raw data are turned in to Laboratory Information Services for processing and storage in the secured central filing location.

Laboratory Notebooks--Each instrument will have its own laboratory notebook. After each analysis, the analyst will record in the notebook the following information:

1. Problems encountered during the digestion/analysis.
2. Comments about the samples and/or analytical procedure.
3. Instrument used.
4. Method used (GFAA, CVAA, ICAP).
5. Date of analysis.
6. Analyst(s).
7. Element.
8. Sample matrix.
9. Instrument conditions.
10. Field group.
11. Sample numbers.
12. QC data, and
13. Raw data.

Standards--Stock standard solutions are purchased from vendors. These stock solutions are certified by the vendor for purity and concentration.

Standard preparations are recorded in a logbook. The information recorded includes preparer's name, lot number, date of preparation, volumes used, calculated concentrations, and dilutions.

Volumetric dilutions are made from the stock solution to obtain working solutions. Serial dilutions are then made from the working solutions to obtain working standards to be used to generate standard curves. Working standard solutions are stored in volumetric flasks and properly labeled with the following information:

1. Preparer's name or initials.
2. Date of preparation.
3. Element(s).

4. Concentration, and
5. Expiration date (if not prepared daily).

#### 12.1.1.4 Inorganics

Raw data for most inorganic analyses is documented through the use of parameter notebooks. The notebooks may vary slightly in format dependent upon the type of analysis, but, at a minimum will contain the following:

1. Analysis date.
2. Parameter.
3. STORET and method code.
4. Standard curve range and responses (where applicable).
5. Analytical batch number.
6. Instrument conditions (where applicable).
7. Method reference.
8. Sample, standard, QC sample and blank identification and responses or concentration as applicable, and
9. Analyst's signature.

Raw data for specialized instrumental analyses are documented in the following sections.

#### Inorganic Analysis by Autoanalyzer

Strip Charts--The following information will be recorded on the strip chart:

1. Analyst's name, initials, or employee number.
2. Date of analysis.
3. Instrument used.
4. Analytical parameter.
5. Analytical batch number.
6. Standard calibration setting.
7. Sample, standard, QC sample, and blank sample identification above appropriate peaks, with dilution factors when applicable.

After the data have been reduced and recorded in the parameter notebook, the strip charts are placed in a batch file folder with copies of the notebook pages and any additional related information. These data are entered manually or are electronically uploaded to CLASS™ to generate a uniquely numbered batch. The batch is reviewed for correctness and signed by the analyst and submitted for peer review. When peer review is complete, the reviewer signs and submits the batch to Laboratory Information Services to be finalized and stored in the secured central filing location.

Laboratory Notebooks--Each analytical parameter has its own laboratory notebook.

During analysis, the following information is recorded:

1. Date of analysis.
2. Parameter.
3. STORET and method code.
4. Batch number.
5. Instrument conditions.
6. Calibration standard setting and response.
7. Standard curve range and date of preparation.
8. Sample and QC identification numbers, and
9. Analyst's signature.

Inorganic Analysis by Ion Chromatography

Chromatograms--All information on the chromatograms from each analytical run is electronically recorded from the input provided during run set up. This information includes the following:

1. Analyst's initials;
2. Analytes;
3. Analysis date and time;
4. Instrument identification;
5. Integration parameters;
6. Sample, standard, and QC sample identification with concentrations and responses; and

7. Dilution factors when appropriate.

These data are electronically uploaded to CLASS™ and a unique batch number is assigned. The data are reviewed by the analyst for correctness, signed and submitted for peer review. When peer review is complete, the reviewer signs and submits the batch to Laboratory Information Services to be finalized and stored in the secured central filing location.

Laboratory Notebooks-Each instrument has its own laboratory notebook. The following information is recorded in the notebook during the set up of the analytical run:

1. Analysis date.
2. Analyte.
3. STORET and method code.
4. Instrument identification and operating conditions.
5. Calibration standards and preparation dates.
6. Notes and comments as appropriate, and
7. Sample and QC sample identification numbers with dilution factors when applicable.

#### 12.1.1.5 Radiochemistry

Instrument Logbooks--Each instrument will have its own laboratory notebook. After each analysis, the analyst will record in the notebook the following information:

1. Type of analysis being performed.
2. Name of person(s) doing the analysis.
3. Sample names and numbers.
4. Notes of GM surveys performed on samples prior to counting.
5. Background information on samples prior to counting.
5. Background information on each detector.
6. Analysis date.
7. Documentation concerning sample analysis (Did samples appear to have significant count rate?).

8. Physical appearance of samples.
9. Flow rate of gases, and
10. Detector conditions.

Service records are maintained in a separate logbook and contain all information pertinent to calibration, cleaning, and repair of instrumentation.

## 12.2 DATA VALIDATION

Unless otherwise specified by the client, the following procedures for review/validation of data are employed.

### 12.2.J LABORATORY ACTIVITIES

Data review is initiated by the bench analyst upon conversion of raw data into reportable data. The bench analyst reviews preliminary data entries, calculations, holding times and precision, accuracy, and calibration checks. The analyst provides explanation and/or corrective action for any method control parameters which are outside criteria and signs the analytical batch when ready to release the data for further processing and review.

The analyst's supervisor or a designated reviewer also reviews the analytical batch documentation associated with the batch (such as sample preparation/ digestion/extraction logsheets, instrument logsheets, copy of sample preparation, etc.) and any explanations or corrective actions provided by the analyst. If the supervisor or designee is not satisfied with the explanations or corrective actions, an additional explanation or corrective action is provided in the batch. The supervisor or designee signs the analytical batch when satisfied with the data.

The Laboratory Coordinator reviews analytical data batches that have explanations and corrective actions and signs the analytical batch when satisfied with the data. The Laboratory Coordinator also reviews all final data reports for inconsistencies and

completeness prior to releasing the reports to the client; qualification or flagging, if needed, of data and/or QC summaries are provided as appropriate.

The Laboratory QA/QC Coordinator performs quarterly audits to check that required QC procedures are being followed. This procedure entails random review of analytical batches to see that the QC designated for the analysis are being consistently performed. A record of this audit is maintained by the Laboratory QA/QC Coordinator. The Laboratory QA/QC Coordinator also initiates and follows up on corrective actions to resolve QC problems.

The minimum QA/QC data that should be included in the data batch are the following:

1. Sample data (matrix, date of extraction, and date of analysis);
2. Parameter, result, and test method identification;
3. Sample-specific detection limits for each parameter; and
4. Results of laboratory control data, method blanks, spikes, and replicates (as required).

### 12.3 DATA REPORTING

Data reporting is accomplished by the Laboratory Coordinator using CLASS™. The data flow scheme for CLASS™ is presented in Figure 12-1. All client data and pertinent field information are entered into CLASS™ directly from the chain of custody sheets. A copy of this information is given to the Laboratory Coordinators for verification to ensure that all pertinent information is available and correct. An example of a Results of Analysis Report is shown in Figure 12-2. CLASS™ sorts all available samples for analyses for each parameter by due date, client ID, field group, etc. Daily reports are generated by Laboratory Information Services and sent to each analytical department to notify them of samples that are due for analysis.

Each analyst who enters their analytical information directly into CLASS™ as a batch report. The analysts enter standard curves (linear, quadratic, or logarithmic), method blank and control spike data into CLASS™ to create a batch. Sample responses are entered into the batch and the final results are then calculated according to the methods specified in Section 7.0 of the CompQAP and Section 12.1. The analysts check all their data to ensure that all information is available and correct before signing the batch report. The analyst's supervisor or Department Manager then reviews the final batch report and signs it to verify that all data are accurate as reported. The batch is then finalized by Laboratory Information Services. Once a batch is finalized, the analyst or analyst's supervisor cannot change the data. Any requests for corrections are sent to Laboratory Information Services where the changes are made. The Laboratory Coordinator generates and prepares from CLASS™ the final report to the client. The Laboratory Coordinator reviews the final reports for inconsistencies and completeness. Deliverables will comply with NEESA/HAZWVAP or project specific requirements for the DQOL (Data Quality Objective Level) specified for each project. Prior to the release to the client the final report is peer reviewed using the checklist in Figure 12-3.

#### 12.4 DATA STORAGE

A hard copy of all batch folders, supporting documents, and project files are filed chronologically by department in the secured centralized batch storage located in a separate building. The newer batch folders are also stored chronologically by department in locked file cabinets located in Information Services Department. The batch folders include copies of sample preparation/digestion/extraction logsheets, copies of instrument logsheets and standard preparation logbook pages, laboratory chain of custody, and raw data. The batch folders may be checked out for review by laboratory analysts, Laboratory Coordinators, or laboratory personnel. A program for tracking folder status and custody is available in CLASS™. This program is used to track folders that have been checked out. In addition, any personnel checking out a batch folder from Laboratory Information Services is required to sign, date, indicate the batch numbers, and department numbers on the Document Control Logbook (Figure 12-4). When the laboratory or QA personnel are finished reviewing the batch folders, they are returned to

Laboratory Information Services and the Document Control Logbook is signed and dated. At a minimum, all project files are kept for 5 years.

The original laboratory notebooks and analysis notebooks are used until they are filled, then sequentially numbered and archived by the supervisor within each department.

All data stored in the CLASS™ database are backed up every day except Saturday using electronic optical disks or equivalent high-density storage media. Disks are stored in special files and archived in a separate building in a secured air-conditioned location.

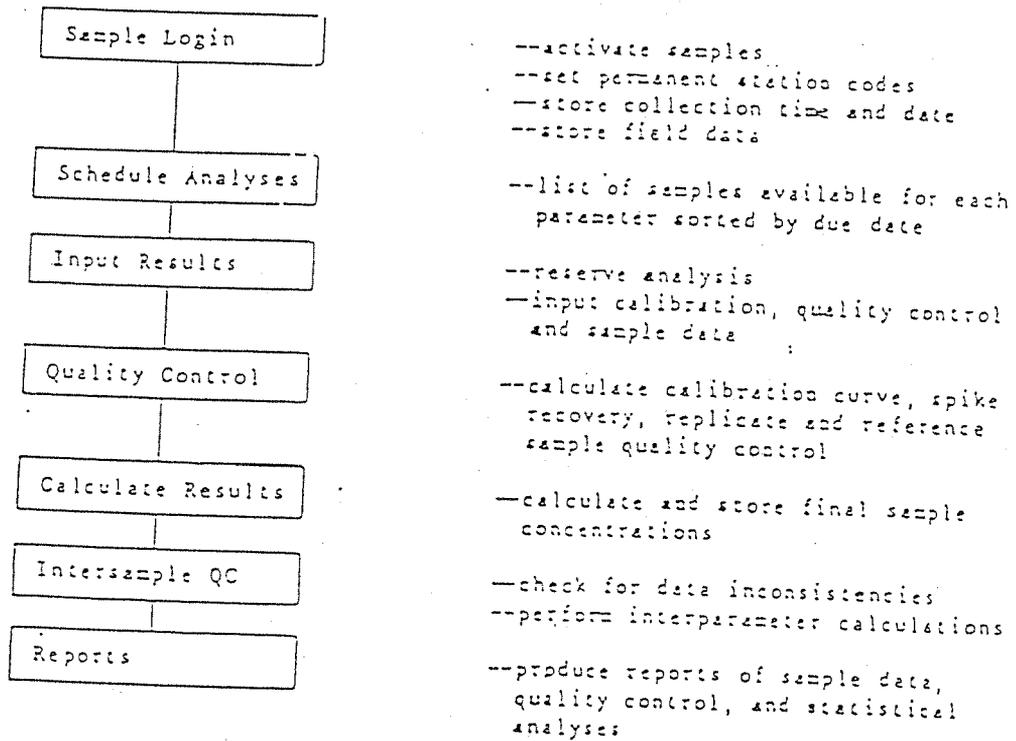


Figure 12-1  
FLOWCHART OF THE CLASS PROGRAM

SOURCE: ESE.

ENVIRONMENTAL SCIENCE  
& ENGINEERING, INC.

Environmental Science and Engineering DATE 3/01/91 STATUS: FINAL

PROJECT NUMBER: 99999 0000 PROJECT NAME: EXAMPLE PROJECT  
 FIELD GROUP: XXXXXXXX LAB COORDINATOR: ALAN CHEMY

RESULTS OF ANALYSIS

PARAMETERS	UNITS	STORET METHOD	MW5	MW6	MW7	MW10
			XXXXXX 1	XXXXXX 2	XXXXXX 3	XXXXXX 4
DATE			04/13/90	04/13/90	04/12/90	04/13/90
TIME			11:15	13:00	15:00	14:00
LEAD, TOTAL		1051	16.1	79.9	22.8	13.9
	UG/L	GFAA				
1,2-DIBROMOETHANE		77651	<0.013	0.078	<0.013	<0.013
(EDB)	UG/L	EC				
CARBON TETRACHLORIDE		32102	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
CHLOROBENZENE		34301	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
CHLOROETHANE		34311	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
CHLOROFORM		32105	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
CHLOROMETHANE		34418	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,1-DICHLOROETHANE		34496	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,2-DICHLOROETHANE		34531	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,1-DICHLOROETHYLENE		34501	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
TRANS-1,2-DICHLORO		34546	<1.00	<1.00	<1.00	<1.00
ETHENE	UG/L	HA				
METHYLENE CHLORIDE		34423	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,1,2,2-TETRACHLORO		34516	<1.00	<1.00	<1.00	<1.00
ETHANE	UG/L	HA				
TETRACHLOROETHENE		34475	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,1,1-TRICHL'ETHANE		34506	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
1,1,2-TRICHL'ETHANE		34511	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
TRICHLOROETHENE		39160	<1.00	<1.00	<1.00	<1.00
	UG/L	HA				
BENZENE		34030	<1.00	25.0	<1.00	<1.00
	UG/L	PI				
ETHYLBENZENE		34371	<1.00	<1.00	<1.00	<1.00
	UG/L	PI				
TOLUENE		34010	<1.00	<1.00	<1.00	<1.00
	UG/L	PI				
XYLENES, TOTAL		81551	<1.00	150	<1.00	<1.00
	UG/L	PI				
METHYL-T-BUT'ETHER		98576	2.90	5.50	<1.00	5.42
	UG/L	PI				
VOA, TOTAL (BTEX, T)		97512	<1.00	175	<1.00	<1.00
	UG/L	PI				

Figure 12-2  
 FINAL RESULTS OUTPUT FROM THE DATA  
 PROGRAM

SOURCE: ESE.

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### ESE ANALYTICAL SERVICES DELIVERABLE CHECKLIST

Project # \_\_\_\_\_ Project Name \_\_\_\_\_

Field Group(s) \_\_\_\_\_

				<u>Comment</u>
Department's "excepted" batch checklist(s) reviewed?	Y	N		
Corrective actions*/data flagging required?	Y	N		
If yes, performed?	Y	N		
Blank data (equipment, rinseate, field, trip) reviewed?	Y	N	NA	
Corrective actions*/data flagging required?	Y	N		
If yes, performed?	Y	N		
Field dupe data reviewed?	Y	N	NA	
Corrective actions*/data flagging required?	Y	N		
If yes, performed?	Y	N		
Data set reviewed against historical?	Y	N	NA	
Data set reviewed for reasonableness?	Y	N		
If yes, by _____ sell, or _____				
In general, were project OC requirements met?	Y	N		
If no, add comments below.				
OC deliverable prepared and reviewed?	Y	N	NA	
Deliverables in conformance with requirements?	Y	N		
* Attach a copy of any corrective action				

Comments:

Completed by \_\_\_\_\_

Reviewed by \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_

Distribution:

WHITE - Information Services    YELLOW - Laboratory Coordinator    PINK - Div. Administration

Figure 12-3  
DELIVERABLE CHECKLIST

SOURCE: ESE

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### 13.0 CORRECTIVE ACTION

Corrective action is necessary when any measurement system fails to follow this LCQAP. Items that may need corrective action range from a minor problem of a field team member failing to sign a field form to a major problem of an analyst using an improper analytical method. For this reason, corrective action protocols must be flexible.

#### 13.1 ANALYTICAL

In general, items needing corrective action fall into three "correction" categories: short-term, long-term, and QC; each item requires different action.

##### 13.1.1 SHORT-TERM CORRECTIVE ACTIONS

These actions consist of minor and major problems that can be corrected immediately. Examples include failure to date or sign a standard form, incorrectly preserving sample, and errors in data entry. Corrective action is initiated by verbally calling attention to the problem followed by written notification.

##### 13.1.2 LONG-TERM CORRECTIVE ACTIONS

The actions consist of minor and major problems that require a series of actions to resolve the problem. The actions to be taken are coordinated by the Project QA Coordinator or Laboratory QA/QC Manager, and a QA corrective action and routing form (Figure 13-1) is used to track the action. An example of this type of corrective action is as follows:

Problem--A laboratory analyst fails to calibrate a pH meter prior to use.

Corrective Action--The problem is identified by the person originating the corrective action, responsibility is assigned to an appropriate person (may be someone other than person failing to calibrate the instrument), re-training of the analysis in the use of the instrument is required, and the instrument is calibrated in prior to the next analysis. The Project QA Coordinator or the QA/QC Coordinator audits this process to assure that it is completed in an expeditious manner.

CORRECTIVE ACTION REQUEST AND ROUTING FORM

1. Identification of a problem: \_\_\_\_\_ CA# \_\_\_\_\_  
 Originator: \_\_\_\_\_ Date: \_\_\_\_\_  
 Nature of Problem: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. Determination of Required Action:  
 Responsibility Assigned to: \_\_\_\_\_ Due Date: \_\_\_\_\_  
 Recommended Action: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3. Implementation of Required Action:  
 Responsibility Assigned to: \_\_\_\_\_ Due Date: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4. Assuring Effectiveness of Action:  
 Responsibility Assigned to: \_\_\_\_\_ Due Date: \_\_\_\_\_  
 Procedure to Assure Effectiveness: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Corrective action status: \_\_\_\_\_ Acceptable \_\_\_\_\_ Unacceptable  
 Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Figure 13-1  
 QUALITY ASSURANCE CORRECTIVE ACTION  
 REQUEST AND ROUTING FORM

SOURCE: ESE.

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### 13.1.3 QUALITY CONTROL CORRECTIVE ACTION

Consists of corrective action following a failure to meet QC criteria specified in this LCQAP and the analytical methods. Actions taken consist of two types: those resolved within each analytical department and those resolved outside the department. Examples outlining the differences between these two types of corrective action are as follows:

#### WITHIN DEPARTMENT ACTION

<u>QC Failure</u>	<u>Department Action</u>
Tuning results for GC/MS fail criteria in Methods 624 and 625	Analyst retunes instrument
Standard curve correlation coefficient is less than 0.995	Analyst investigates problem and reruns curve and samples
Sample response falls outside calibration curve	Analyst dilutes sample into range of curve

#### OUTSIDE DEPARTMENT ACTION

<u>QC Failure</u>	<u>Department Action</u>
Holding times are exceeded	Notify Project Manager, Laboratory Coordinator, and Project QA Coordinator; resampling may be necessary

The corrective action procedures that will be taken by the Gainesville Laboratory following a failure to meet QC criteria specified in this LCQAP and the analytical methods are summarized in Tables 13-1 through 13-6.

Corrective actions in the laboratory are documented and tracked using the Corrective Action Form (Figure 13-1).

Corrective actions may be initiated for each measurement system (individual disciplines) by subproject managers or other responsible individuals such as the Laboratory QA/QC Manager, Department Manager, or Division Manager. The Project QA Coordinator,

Table 13-1. Summary of Corrective Action Procedures for Metals Analyzed by Graphite Furnace and Cold Vapor Atomic Absorption Spectroscopy

Quality Control	Acceptance Criteria	Corrective Action
Initial calibration verification standard (ICV)	$\pm 10\%$ of true value	Rerun standard, if still out of control, recalibrate instrument.
Calibration blank (ICB)	$\leq$ two times DL (listed in Table 5-3)	Rerun the blank, if still out of control, reprocess and reanalyze the blank.
Calibration curve correlation coefficient	$\geq 0.995$	Rerun calibration standards, if still out of control, prepare new calibration standards and recalibrate the instrument or document why data are acceptable.
Calibration curve	Brackets all sample responses	Dilute and reanalyze within the calibration curve range or document why data are acceptable if reanalysis is not possible.
Continuing calibration verification standard (CCV)	$\pm 20\%$ of true value	Rerun standard, if still out of control, recalibrate instrument and reanalyze samples run since last acceptable CCV.
Method blank (MB)	$\leq$ two times DL (listed in Table 5-3)	Determine the cause of the blank problem, redigest set, if necessary, or document why data are acceptable.

Table 13-1. Summary of Corrective Action Procedures for Metals Analyzed by Graphite Furnace and Cold Vapor Atomic Absorption Spectroscopy (Continued, Page 2 of 2)

Quality Control	Acceptance Criteria	Corrective Action
Standard matrix spike (QC check standard)	See Table 5-2 for percent recovery control limits	Determine and correct problem, redigest and reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike	See Table 5-2 for percent recovery control limits	If standard matrix spike analytes are within control limits, qualify the data. If not, determine and correct the problem, redigest and reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike	See Table 5-2 for RPD control limits	If standard matrix spike analytes are within control limits, qualify the data. If not, determine and correct the problem, redigest and reanalyze samples, if necessary, or document why data are acceptable.

Note: DL = detection limit.  
 RPD = relative percent difference.

Source: ESE.

Table 13-2. Summary of Corrective Action Procedures for Metals Analyzed by Inductively Coupled Plasma Emission Spectroscopy

Quality Control	Acceptance Criteria	Corrective Action
Initial calibration verification standard (ICV)	$\pm 10\%$ of true value	Rerun standard, if still out of control, recalibrate instrument.
Calibration blank (ICB)	$\leq$ two times DL (listed in Table 5-2)	Rerun the blank, if still out of control, reprocess and reanalyze the blank.
Interference check standard (ICS)	$\pm 20\%$ of true value	Rerun standard, if still out of control, recalibrate instrument and reverify calibration.
Continuing calibration verification standard (CCV)	$\pm 10\%$ of true value	Rerun standard, if still out of control, recalibrate instrument and reanalyze all samples run since last acceptable CCV or document why data are acceptable.
Method blank (MB)	$\leq$ two times DL (listed in Table 5-2)	Determine the cause of the blank problem; redigest samples if necessary or document why data are acceptable.

Table 13-2. Summary of Corrective Action Procedures for Metals Analyzed by Inductively Coupled Plasma Emission Spectroscopy (Continued, Page 2 of 2)

Quality Control	Acceptance Criteria	Corrective Action
Standard matrix spike (QC check standard)	See Table 5-2 for percent recovery control limits	Determine and correct problem, redigest and reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike	See Table 5-2 for percent recovery control limits	If standard matrix analytes are within control limits, qualify the data. If not, determine and correct problem, reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike duplicate	See Table 5-2 for RPD control limits	If standard matrix analytes are within control limits, qualify the data. If not, determine and correct the problem, reanalyze the samples, if necessary, or document why data are acceptable.

Note: DL = detection limit.  
 RPD = relative percent difference.

Source: ESE.

Table 13-3. Summary of Corrective Action Procedures for Inorganics, Oil and Grease, Petroleum Hydrocarbons, and TOX

Quality Control	Acceptance Criteria	Corrective Action
Calibration curve coefficient	$\geq 0.995$	Rerun calibration correlation standards if still out of control Prepare new calibration standards and recalibrate the instrument, or document why data are acceptable.
Calibration curve	Brackets all sample responses	Dilute and reanalyze samples within the calibration curve range, or document why data are acceptable.
Calibration blank	$\leq$ two times the DL (listed in Table 3-3)	out of control, reprocess and reanalyze the blank;
Continuing calibration verification standard (CCV)	$\pm 7.20\%$ of true value	Rerun standard, if still out of control, recalibrate instrument and reanalyze samples run since last acceptable CCV or document why data are acceptable.
Method blank (MB)	$\leq$ two times the DL (listed in Table 3-3)	Determine the cause of the blank problem, reanalyze samples, if necessary, or document why data are acceptable.
Sample replicate (RP) <sup>a</sup>	See Table 3-2 for RPD	Determine and correct control limits problem, reanalyze sample, if necessary, or document why data are acceptable.

Table 13-3. Summary of Corrective Action Procedures for Inorganics, Oil and Grease, Petroleum Hydrocarbons, and TOX (Continued, Page 2 of 2)

Quality Control	Acceptance Criteria	Corrective Action
Standard matrix spike (QC check standard)	See Table 5-2 for percent recovery control limits	Determine and correct problem, reanalyze samples if necessary or document why data are acceptable.
Sample matrix spike	See Table 5-2 for percent recovery control limits	If standard matrix analytes are within control limits, qualify the data. If not, determine and correct the problem, reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike duplicate	See Table 5-2 for RPD control limits	If standard matrix analytes are within control limits, qualify the data. If not, determine and correct the problem, reanalyze the samples, if necessary, or document why the data are acceptable.

Note: DL = detection limit.  
 RPD = replicate percent difference.

\*Sample replicate is only required for residues, pH, specific conductivity, and turbidity analyses.

Source: ESE.

Table 13-4. Summary of Corrective Action Procedures for Radionuclides

Quality Control	Acceptance Criteria	Corrective Action
Background check	See Section 9.4.12	Check and clean the instrument and repeat the background check.
Performance check standard	See Section 9.4.12	Check the instrument and recount the standard. If still out of control, recalibrate the instrument and recount the standard or document why data are acceptable.
Method blank	$\leq$ two times the RL (listed in Table 5-3)	Determine the cause of the blank problem, reanalyze samples, if necessary, or document why data are acceptable.
Sample replicate (RP)	See Table 5-2 for RPD control limits	Determine and correct the problem, reanalyze sample, if necessary, or document why data are acceptable.
Standard matrix spike (QC check standard)	See Table 5-2 for percent recovery control limits	Determine and correct the problem, reanalyze standard samples, if necessary, or document why data are acceptable.
Sample matrix spike	See Table 5-2 for percent recovery control limits	Determine and correct the problem, reanalyze samples, if necessary, or document why data are acceptable.

Table 13-4. Summary of Corrective Action Procedures for Radionuclides

Quality Control	Acceptance Criteria	Corrective Action
Sample matrix spike duplicate	See Table 5-2 for RPD control limits	Determine and correct the problem, reanalyze samples, if necessary, or document why data are acceptable.

Note: RL = reporting limit  
RPD = replicate percent difference

Source: ESE.

Table 13-5. Summary of Corrective Action Procedures for Organics Analyzed by Gas Chromatography and High Pressure Liquid Chromatography

Quality Control	Acceptance Criteria	Corrective Action
Calibration curve correlation coefficient	$\geq 0.995$	Rerun calibration standards, if still out of control, prepare new calibration standards and recalibrate the instrument, or document why the data are acceptable.
Calibration curve	Brackets all sample responses	Dilute and reanalyze samples within the calibration curve range, or document why data are acceptable.
Continuing calibration standard (CCS)	$\pm 15\%$ of standard initial response for GC (except for NPD which is $\pm 25\%$ ) and $\pm 10\%$ of standard initial response for HPLC	Rerun standard, if still out of control, recalibrate instrument and reanalyze samples when last CCS is acceptable, or document why data are acceptable.
Method blank (MB)	$<$ than two times DL for nonvolatile organics (listed in Tables 5-9 to 5-13, 5-16 to 5-35, and 5-40 to 5-61)	Determine and correct cause of the blank problem, reanalyze the samples, if necessary, or document why data are acceptable.
Method blank (MB)	No greater than five times DL (listed in Tables 5-5 and 5-7) for methylene chloride, acetone, toluene, and xylene organics. All other analytes must be $\leq$ two times DL (listed in Tables 5-5 and 5-7)	Reanalyze another MB. If second MB exceeds criteria, clean and recalibrate analytical system or document why data are acceptable.

Table 13-5. Summary of Corrective Action Procedures for Organics Analyzed by Gas Chromatography and High Pressure Liquid Chromatography  
 (Continued, Page 2 of 3)

Quality Control	Acceptance Criteria	Corrective Action
Standard matrix spike (SP)	See Tables 5-4 to 5-13, 5-16 to 5-35, and 5-40 to 5-61 for percent recovery control limits	Determine and correct the problem, reanalyze samples if necessary, or document why data are acceptable.
Sample matrix spike	See Tables 5-4 to 5-13, 5-16 to 5-35, and 5-40 to 5-61 for percent recovery control limits	If standard matrix spike analytes are within control limits, qualify the data. If not, determine and correct the problem, reanalyze samples, if necessary, or document why data are acceptable.
Sample matrix spike duplicate	See Tables 5-4 to 5-13, 5-16 to 5-35, and 5-40 to 5-61 for RPD control limits	If standard matrix analytes are within control limits, qualify the data. If not, determine and correct the problem, reanalyze samples, if necessary, or document why data are acceptable.
Surrogates* (SUR)	See Tables 5-18, 5-20, and 5-28 for percent recovery control limits	If surrogates in the MB or SP are within control limits, qualify data. If not, reanalyze samples with surrogates outside criteria or document why data are acceptable.

Table 13-5. Summary of Corrective Action Procedures for Organics Analyzed by Gas Chromatography and High Pressure Liquid Chromatography  
(Continued, Page 3 of 3)

---

Note: DL = detection limit.  
GC = gas chromatography.  
HPLC = high pressure liquid chromatography.  
NPD = nitrogen-phosphorus detector.  
RPD = relative percent difference.

\*Surrogate/surrogates will only be spiked in samples if specified by the method.

Source: ESE.

Table 13-6. Summary of Corrective Action Procedures for Organics by Gas Chromatography/Mass Spectrometry

Quality Control	Acceptance Criteria	Corrective Action
DFTPP or BFB instrument tuning	See Table 8-1 for tuning criteria	Retune instrument until within criteria.
Initial calibration standards	Percent RSD of RF of the calibration check compounds (CCC) are $\leq 30$ percent ( $\leq 35$ percent for Method 625)	Rerun calibration standards, if still out of criteria, prepare new calibration standards and rerun standards.
One-point daily calibration	RFs of CCCs are $\leq 25$ percent ( $\leq 20$ percent for Method 625) from average RFs in the initial calibration	Rerun standard, if still out of control, rerun calibration curve, or document why data are acceptable.
Method blank (MB)	$<$ two times the DL (listed in Table 5-39) for semivolatiles organics	Evaluate the impact of the presence of any target analytes in the method blank, the presence of low concentrations of phthalate may be acceptable. Reextract and reanalyze samples if presence of target analytes are unacceptable or document why data are acceptable. Background subtraction may be applied.

Table 13-6. Summary of Corrective Action Procedures for Organics by Gas Chromatography/Mass Spectrometry (Continued, Page 2 of 3)

Quality Control	Acceptance Criteria	Corrective Action
Method blank (MB)	No greater than 5 times the DL (listed in Tables 5-15 and 5-37) for methylene chloride, acetone, toluene, and xylene for volatile organics. All other analytes must be $\leq$ two times DL (listed in Tables 5-15 and 5-37)	Reanalyze another MB. If second MB exceeds criteria, clean and recalibrate the analytical system or document why data are acceptable.
Surrogate (SUR)	See Tables 5-14, 5-36, and 5-38 for percent recovery control limits	If surrogates in the MB or SP are within limits, qualify the data. If not, reanalyze samples with surrogates outside criteria or document why data are acceptable.
Standard matrix spike (SP)	See Tables 5-14, 5-36, and 5-38 for percent recovery control limits	If surrogates in the MB are within control limits, qualify the data. If surrogates in the MB are not within control limits, determine and correct the problem, reextract and reanalyze the sample, if necessary or document why data are acceptable.

Table 13-6. Summary of Corrective Action Procedures for Organics by Gas Chromatography/Mass Spectrometry (Continued, Page 3 of 3)

Quality Control	Acceptance Criteria	Corrective Action
Sample matrix spike	See Tables 5-14, 5-36, and 5-38 for percent recovery control limits	If standard matrix spike compounds are within criteria, qualify the data. If not, check surrogates in the MB or SP. If within criteria, qualify the data. If both QCs are outside criteria, determine and correct the problem, reanalyze the samples or document why the data are acceptable.
Sample matrix spike duplicate	See Tables 5-14, 5-36, and 5-38 for RPD control limits	If standard matrix spike compounds are within criteria, qualify the data. If not, check surrogates in the MB or SP. If within criteria, qualify the data. If both QCs are outside criteria, determine and correct the problem, reanalyze the samples if necessary or document why data are acceptable.

Note: DL = detection limit.  
 RPD = relative percent difference.

Source: ESE.

Laboratory QA/QC Manager, Laboratory Department Manager, or Laboratory Director will be responsible for approving the corrective action.

### 13.2 EXTERNAL SOURCES

Corrective action may also be initiated from external sources. This may include performance sample results, split samples, audits (onsite or field by EPA, HRS, FDER, USATHAMA, HAZWRAP, NEESA, etc.), and data validation/review. Corrective actions recommended by agencies such as EPA, DER, etc. are prioritized, promptly acted on, and overseen by the Project QA Coordinator or Laboratory QA/QC Manager. Actions taken to resolve the problem will be documented and kept by the Project QA Coordinator or Laboratory QA/QC Manager.

## 14.0 PERFORMANCE AND SYSTEM AUDITS AND PERSONNEL TRAINING

### 14.1 INTRODUCTION

Two types of audit procedures will be used to assess and document performance of laboratory staff: system audits and performance audits. These are performed at frequent intervals by the Laboratory QA/QC Coordinator and QA Coordinator. These audits form one of the bases for corrective action requirements and constitute a permanent record of the conformance of measurement systems to QA requirements.

### 14.2 SYSTEM AUDITS

System audits are inspections of training status, records, QC data, calibrations, and conformance to SOPs without the analysis of check samples. System audits are performed quarterly.

The system audit protocol for the laboratory is summarized as follows:

The QA Coordinator and Laboratory QA/QC Manager or designee will perform the laboratory system audit using the checklist in Figures 14-1 through 14-4. The documents to be reviewed are:

- a. Parameter and/or laboratory notebooks;
- b. Instrument logbooks;
- c. Sample log-in, dispensing, and labeling for analysis;
- d. QC criteria update for spike recoveries; and
- e. Verify that deficiencies in the last audit were corrected.

Department No. \_\_\_\_\_

Sample Storage Areas

Room No. \_\_\_\_\_

ITEM	YES	NO	NA
1. Is the check-out sheet being used properly?			
2. Is an S.O.P. for sample receipt, storage, and tracking available?			
3. Are the sample tracking forms completed?			
4. Is the area secured?			
5a. Is the temperature log current?			
5b. Is appropriate corrective action taken for any out-of-control readings?			
6. Are the samples properly labeled?			
Comments: _____ _____ _____ _____ _____ _____ _____			

Figure 14-1  
AUDIT CHECKLIST FOR SAMPLE STORAGE AREAS

SOURCE: ESE.

ENVIRONMENTAL SCIENCE  
& ENGINEERING, INC.

Department No. \_\_\_\_\_

Room No. \_\_\_\_\_

Sample Receiving

ITEM	YES	NO	NA
1. Is an S.O.P. for receipt, log-in, and transfer to storage areas available?			
2. Are the tracking forms complete?			
Comments: _____			
_____			
_____			
_____			
_____			

Department No. \_\_\_\_\_

Room No. \_\_\_\_\_

Glassware Washroom

ITEM	YES	NO	NA
1. Is the area clean?			
2. Are S.O.P.'s available?			
3. Is clean glassware stored so as to avoid contamination?			
Comments: _____			
_____			
_____			
_____			
_____			

Figure 14-2  
AUDIT CHECKLIST FOR SAMPLE RECEIVING  
AND GLASSWARE WASHROOM AREAS

SOURCE: ESE.

ENVIRONMENTAL SCIENCE  
& ENGINEERING, INC.

Department No. \_\_\_\_\_

Sample Preparation Areas

Room No. \_\_\_\_\_

ITEM	YES	NO	NA
1. Are refrigerator/freezer temperature logs maintained daily?			
2. Are appropriate corrective actions taken for any out-of-control readings?			
3. Are the balance calibration logs maintained daily?			
4. Is glassware stored so as to avoid contamination?			
5. Are samples and reagents stored so as to avoid contamination?			
6. Are the work spaces clean and organized to avoid cross-contamination and sample-handling errors?			
7. Are appropriate S.C.P.'s available?			
8. Are instrument run logs maintained? (Org. ext. lab)			
9. Are instrument maintenance logs maintained?			
10. Are the standard preparation logs completely filled out, including preparer and reviewer signatures?			
11. Are the sample preparation logs completely filled out, including preparer and reviewer signatures?			
12. Do all log books have control numbers?			
13. Are documentation corrections made properly? (A single line through the error, the date the correction was made, the correctors initials, and a short explanation or correction code if necessary.)			
14. Are reagents labeled with the date received, date opened, and expiration date?			
15. Are extracts labeled properly?			
16. Are properly labeled waste containers available?			
Comments: _____ _____ _____ _____ _____ _____			

Figure 14-3  
 AUDIT CHECKLIST FOR SAMPLE PREPARATION  
 AREAS

SOURCE: ESE.

ENVIRONMENTAL SCIENCE  
 & ENGINEERING, INC.

Department No. \_\_\_\_\_

Sample Analysis Areas

Room No. \_\_\_\_\_

ITEM	YES	NO	NA
1. Are refrigerator/freezer temperature logs maintained daily?			
2. Are appropriate corrective actions taken for any out-of-control readings?			
3. Are the balance calibration logs maintained daily?			
4. Is glassware stored so as to avoid contamination?			
5. Are samples and standards stored so as to avoid contamination?			
6. Are the work spaces clean and organized to avoid cross-contamination and sample-handling errors?			
7. Are appropriate S.O.P.'s available?			
8. Are instrument run logs maintained?			
9. Are instrument maintenance logs maintained?			
10. Are the standard preparation logs completely filled out, including preparer and reviewer signatures?			
11. Are the sample preparation logs completely filled out, including preparer and reviewer signatures?			
12. Do all log books have control numbers?			
13. Are documentation corrections made properly? (A single line through the error, the date the correction was made, the correctors initials, and a short explanation or correction code if necessary.)			
14. Are reagents labeled with the date received, date date opened, and expiration date?			
15. Are properly labeled solvent waste containers available?			
Comments: _____ _____ _____ _____ _____			

Figure 14-4  
AUDIT CHECKLIST FOR SAMPLE ANALYSIS AREAS

SOURCE: ESE.

ENVIRONMENTAL SCIENCE  
& ENGINEERING, INC.

In addition, the Laboratory QA/QC Coordinator or QA Coordinator may monitor analyses randomly to assure adherence to approved analytical methods.

3. Final Reports--The Project QA Coordinator may review all final reports and deliverables before they are sent to the client.

The Gainesville Laboratory is externally audited regularly by the following agencies:

1. State of Florida Department of Health and Rehabilitative Services.
2. State of New Jersey Department of Environmental Protection and Energy.
3. State of California Department of Health.
4. State of Utah Department of Health.
5. U.S. Army Corps of Engineers.
6. American Industrial Hygiene Association, and
7. Army Environmental Center (AEC) (formerly U.S. Army Toxic and Hazardous Materials Agency).

#### 14.3 PERFORMANCE AUDITS

The results of interlaboratory studies may be evaluated by the Project QA Coordinator as part of the performance audits. This evaluation is performed at least quarterly. ESE is participating in the following proficiency programs:

1. National Institute of Occupational Safety and Health (NIOSH) through its Proficiency Analytical Testing Program (PAT).
2. EPA Water Pollution and Water Supply proficiency programs.
3. EPA Radiochemistry Intercomparison Study and Blind Performance Samples.
4. State of New York through its Environmental Laboratory Approval Program (ELAP) for public drinking water and environmental samples categories.
5. State of California Department of Health.
6. U.S. Army Corps of Engineers.

7. U.S. Department of Energy's Environmental Measurements Laboratory Quality Assessment Program, and
8. U.S. Department Of Energy's Hazardous Waste Remedial Actions Program (HAZWRAP).

The following licenses, accreditations, certifications and validations are held by the Gainesville Laboratory:

1. American Industrial Hygiene Association (AIHA).
2. State of Florida Department of Health and Rehabilitative Services for environmental and drinking water analyses.
3. New Jersey Department of Environmental Protection.
4. South Carolina Department of Health and Environmental Control.
5. State of Florida Department of Health and Rehabilitative Services for Radiochemistry.
6. State of California Department of Health Services for hazardous waste testing analyses.
7. State of Tennessee Department of Health and Environment for drinking water and underground storage testing analyses.
8. State of Utah Department of Health.
9. U.S. Army Environmental Center.
10. U.S. Army Corps of Engineers.
11. U.S. Navy, and
12. U.S. Department of Energy's HAZWRAP.

Peer review of all deliverable reports and data will be performed by technically qualified individuals from each major discipline represented in the deliverable. Figure 14-5 is a sample Deliverable Review Sheet.



#### 14.4 PERSONNEL TRAINING

The Gainesville Laboratory personnel are trained on health and safety, QA/QC procedures, analytical methods, and the laboratory data management system as specified in the laboratory's SOP on personnel training (SOP-AS3210-004). New personnel are trained prior to performing any actual laboratory work. Laboratory personnel are also required to attend the health and safety and laboratory QA/QC procedures refresher courses that will be offered yearly. The training that each laboratory personnel had attended are documented on the personnel's training records that are maintained by the Laboratory QA/QC Coordinator.

## 15.0 QUALITY ASSURANCE REPORTS

Activities and actions to be reported will include:

1. Results of ongoing performance, systems and analytical method audits, and
2. Data quality review and significant QA/QC problems with proposed corrective action procedures.

The Laboratory QA/QC Manager reports the results of these activities to the Gainesville Laboratory Management. The QA/QC report is done on a quarterly basis or immediately upon discovery of a problem requiring corrective action.

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APPENDIX B

— RESERVED —

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APPENDIX C

— RESERVED —

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**APPENDIX D**  
**FIELD FORMS**

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PROJECT: \_\_\_\_\_

REPORT NO. \_\_\_\_\_

JOB NO. \_\_\_\_\_

DATE \_\_\_\_\_

QUALITY CONTROL ACTIVITIES (INCLUDING FIELD CALIBRATIONS)

HEALTH AND SAFETY LEVELS AND ACTIVITIES.

PROBLEMS ENCOUNTERED/CORRECTION ACTION TAKEN:

SPECIAL NOTES.

TOMORROW'S EXPECTATIONS:

BY \_\_\_\_\_ TITLE \_\_\_\_\_

**APPENDIX E**  
**STANDARD OPERATING PROCEDURES**

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## SAMPLE CUSTODY

SOP 1-2

Revision: 1

Date: June 30, 1994

Page 1 of 8

Prepared: David O. Johnson / 7-14-94 Technical Review: [Signature] 7/21/94  
Signature/Date Signature/Date  
QA Review: Marguerite E. Jones 7/22/94 Approved: [Signature] 8/12/94  
Signature/Date Signature/Date  
Issued: Rosemary Ellessick 8/19/94  
Signature/Date

### 1.0 OBJECTIVE

Due to the evidentiary nature of samples collected during environmental investigations, possession must be traceable from the time the samples are collected until their derived data are introduced as evidence in legal proceedings. To maintain and document sample possession, sample custody procedures are followed. All paperwork associated with the sample custody procedures will be retained in CDM Federal Programs Corporation (CDM Federal) files unless the client requests that it be transferred to them for use in legal proceedings or at the completion of the contract.

### 2.0 BACKGROUND

#### 2.1 Definitions

Sample - A material to be analyzed that is contained in single or multiple containers representing a unique sample identification number.

Sample Custody - A sample is under custody if:

1. It is in your possession.
2. It is in your view, after being in your possession.
3. It was in your possession and you locked it up.
4. It is in a designated secure area.

Chain-of-Custody Record - Form used to document the transfer of custody of samples from one individual to another.

Custody Seal - A custody seal is a tape-like seal that is part of the chain-of-custody process and is used to detect tampering with samples after they have been packed for shipping.

## SAMPLE CUSTODY

SOP 1-2

Revision: 1

Date: June 30, 1994

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Sample Label - Adhesive label placed on sample containers to designate a sample identification number and other sampling information.

Sample Tag - Tag attached with string to a sample container to designate a sample identification number and other sampling information. Tags may be used when it is difficult to physically place adhesive labels on the container (e.g., in the case of small air sampling tubes).

### 3.0 RESPONSIBILITIES

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

**Field Team Leader** - The Field Team Leader is responsible for ensuring that strict chain-of-custody procedures are maintained during all sampling events. The Field Team Leader is also responsible for coordinating with the subcontractor laboratory to ensure that adequate information is recorded on custody records.

### 4.0 REQUIRED SUPPLIES

- Chain-of-Custody Records (applicable CDM Federal forms)
- Custody seals
- Sample labels or tags
- Clear Tape

### 5.0 PROCEDURES

#### 5.1 Chain-of-Custody Record

This procedure establishes a method for maintaining custody of samples through use of a Chain-of-Custody Record. This procedure will be followed for all samples collected or split samples accepted.

## SAMPLE CUSTODY

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### Field Custody

1. Collect only the number of samples needed to represent the media being sampled. To the extent possible, determine the quantity and types of samples and sample locations prior to the actual fieldwork. As few people as possible should handle samples.
2. The field sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.
3. Sample labels or tags shall be completed for each sample, using waterproof ink.
4. The Field Team Leader determines whether proper custody procedures were followed during the fieldwork and decides if additional samples are required.

### Transfer of Custody and Shipment

1. Samples are accompanied by a Chain-of-Custody Record (see Figure 1 for example of Chain-of-Custody Record). When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the analyst in the appropriate laboratory.
  - The date/time will be the same for both signatures when custody is transferred directly to another person. When samples are shipped via common carrier (e.g., Federal Express), the date/time will not be the same for both signatures. Common carriers are not required to sign the form.
  - In all cases, it must be readily apparent that the person who received custody is the same person who relinquished custody to the next custodian.
  - If samples are left unattended or a person refuses to sign, this must be documented and explained on the Chain-of-Custody Record.
2. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate custody record accompanying each shipment.
3. All shipments will be accompanied by the Chain-of-Custody Record identifying its contents. The original record will accompany the shipment, and the copies will be retained by the Field

## SAMPLE CUSTODY

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Team Leader and if applicable, distributed to the appropriate sample coordinators. Freight bills will also be retained by the Field Team Leader as part of the permanent documentation. (Refer to Figure 1)

### Procedure for Completing CDM Federal Chain-of-Custody Record (Refer to Figure 1.)

1. Record project number.
2. Record Field Team Leader for the project.
3. Record the name and address of the laboratory to which samples are being shipped.
4. Record the record number and total number of records being shipped for the day.
5. Enter the project name/location or code number.
6. Record overnight courier's airbill number.
7. Note sample type (matrix) and reference number. Include reference number on the Chain-of-Custody Record, box #9.
8. Record sample identification number.
9. Enter the reference number from box #7.
10. Enter date of sample collection.
11. Enter time of sample collection in military time.
12. Enter an X in appropriate box for sample designation - composite or grab.
13. Samplers must enter their initials next to the samples they collected.
14. List parameters for analysis and the number of containers submitted for each analysis.
15. Enter MS/MSD (matrix spike/matrix spike duplicate) if sample is for laboratory quality control, or other remarks (e.g. sample depth).



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16. Record the type of the preservative added by reference number and sample pH. Use the remarks column if no space is dedicated to preservative.
17. All samplers must sign in the space provided.
18. The originator checks information entered in items 1 through 17 and then signs the top left "Relinquished by" box, prints his/her name, and enters the current date and time (military).
  - Upon completion of the custody record form, the top two copies (usually white and yellow) shall be sent with the samples to the laboratory; the bottom copy (usually pink) is retained for the project files. Additional copies will be retained for the project file or distributed as required to the appropriate sample coordinators.
19. The laboratory sample custodian receiving the samples checks the sample label information against the custody record form. He or she also checks sample condition and notes anything unusual under "Remarks" on the custody record form. The laboratory custodian receiving custody signs in the adjacent "Received by" box and keeps the pink copy. The white copy is returned to CDM Federal.

### 5.2 Sample Labels and Tags

Sample labels or tags will be utilized for all samples collected or accepted for CDM Federal projects.

1. Place adhesive labels directly on the sample containers. Place clear tape over the label to protect from moisture.
2. Sample tags will be securely attached to the sample bottle. On 80 oz. amber bottles, the tag string may be looped through the ring style handle and tied. On all other containers, it is recommended that the string be looped around the neck of the bottle, then twisted and relooped around the neck until the slack in the string is removed.
3. One label or tag will be completed for each sample container collected. Each label or tag will be completed as follows (see Figure 2 for example of sample tag); labels are completed with the equivalent information:
  - Record the Project Code (i.e., project or task number).
  - Enter the Station Number if applicable.
  - Record the date to indicate the month, day, and year of sample collection.
  - Enter the time (military) of sample collection.

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Figure 2  
 EXAMPLE Sample Tag

 * GPO:1982-401-217		Designate: Comp. <input type="checkbox"/> Grab <input type="checkbox"/>		Preservative: Yes <input type="checkbox"/> No <input type="checkbox"/>				
				ANALYSES				
Project Code	Station No.	Month/Day/Year	Time	Samplers (Signatures)		BOD Solids	Anions (TSS) (TDS) (SS)	
						COD, TOC, Nutrients		
Phenolics								
Mercury								
Metals								
Cyanide								
Oil and Grease								
Organics GC/MS								
Priority Pollutants								
Volatile Organics								
Pesticides								
Mutagenicity								
Bacteriology								
Remains:								
Station Location								
		Tag No.	Lab Sample No.					
		30101						

NOTE: Equivalent sample labels or tags may be used.

## SAMPLE CUSTODY

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- Place a check to indicate composite or grab sample.
- Record the sample location.
- Samplers must sign in the space provided.
- Place a check next to "yes" or "no" to indicate if a preservative was added.
- Under "analyses," place a check next to the parameters for which the sample is to be analyzed. If the desired analysis is not listed, write it in the empty slot. Note: Do not write in the box for "laboratory sample number."
- Under "remarks," add additional, relevant information.

### 5.3 Custody Seals

Custody seals must be placed on the shipping containers prior to shipment. The seal should be signed and dated by a field team member.

Custody seals may also be placed on individual sample bottles. Check with the client or refer to EPA regional guidelines for direction.

### 5.4 Sample Shipping

CDM Federal's Standard Operating Procedure 2-5: Packaging and Shipping of Environmental Samples establishes a uniform method for packaging and shipping low-level environmental samples.

## 6.0 RESTRICTIONS/LIMITATIONS

For EPA Contract Laboratory Program (CLP) sampling events, combined chain-of-custody/traffic report forms or other EPA-specific records may be utilized. Refer to regional guidelines for completing these forms.

## 7.0 REFERENCES

U.S. Environmental Protection Agency, *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.

U.S. Environmental Protection Agency, *Samplers Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990.

# SURFACE SOIL SAMPLING

SOP 1-3

Revision: 1

Date: September 30, 1993

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Prepared: *Amir C. D.* - *9/20/93*  
Signature/Date

Technical Review: *Philip C. D.* *9-21-93*  
Signature/Date

QA Review: *David O. Johnson* *9-20-93*  
Signature/Date

Approved: *John M. [Signature]* *9/24/93*  
Signature/Date

Issued: *Rose Mary Ellersieck* *9/27/93*  
Signature/Date

## 1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to define the techniques and the requirements for collecting surface soil samples.

## 2.0 BACKGROUND

### 2.1 Definitions

Surface Soil - The soil that exists down from the surface approximately one foot (30 centimeters). Depending on application, the soil interval to be sampled will vary.

Grab Sample - A discrete portion or aliquot taken from a specific location at a given point in time.

Composite - Two or more subsamples taken from a specific media and site at a specific point in time. The subsamples are collected and mixed, then a single average sample is taken from the mixture.

Spoon/Scoop - A small stainless steel or teflon utensil approximately 6 inches in length with a stem-like handle.

Trowel - A small stainless steel or teflon shovel approximately 6 to 8 inches in length with a slight (approximately 140°) curve across. The trowel has a stem-like handle (for hand operation). Samples are collected with a spooning action.

### 2.2 Discussion

Surface soil samples are collected to determine the type(s) and level(s) of contamination and are often important to risk assessment. These samples may be collected as part of an investigative plan, site-specific sampling plan, and/or as a screen for "hot spots," which may require more extensive sampling.

## SURFACE SOIL SAMPLING

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Sediment(s) and sludge(s) that have been exposed by evaporation, stream rerouting, or any other means are collected by the same methods as those for surface soil(s). Typically, the top 1 to 2 centimeters (cm) of material, including vegetation, are carefully removed before collection of the sample.

Surface soil and exposed sediment or sludge are collected using stainless steel and/or Teflon-lined trowels or scoops.

### 2.3 Associated Procedures

- CDM Federal SOP 1-2, Sample Custody
- CDM Federal SOP 2-5, Packaging and Shipping of Environmental Samples
- CDM Federal SOP 4-1, Field Logbook Content and Control
- CDM Federal SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites

### 3.0 RESPONSIBILITIES

**Site Manager** - The Site Manager is responsible for ensuring that sampling efforts are conducted in accordance with this procedure and any other SOPs pertaining to specific media sampling.

**Field Team Leader** - The Field Team Leader is responsible for ensuring that field personnel collect surface soil samples in accordance with this and other relevant procedures.

# SURFACE SOIL SAMPLING

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## 4.0 REQUIRED EQUIPMENT

- Site-specific plans
- Field logbook
- Indelible black ink pens and markers
- Labels and appropriate forms/documentation for sample shipment
- Clear tape
- Appropriate sample containers
- Insulated cooler and waterproof sealing tape
- Ice bags or "blue ice"
- Latex or appropriate gloves
- Plastic zip-top bags
- Personal protective clothing and equipment
- Stainless steel and/or Teflon-lined spatulas and pans, trays, or bowls
- Stainless steel and/or Teflon-lined trowels or spoons (or equipment as specified in the site-specific plans)
- Plastic sheeting

## 5.0 PROCEDURES

### 5.1 Preparation

The following steps must be followed when preparing for sample collection:

1. Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan.
2. The collection points shall be stated, located on a site map, and referenced in the field logbook.
3. Processes for verifying depth of sampling must be specified in the site-specific plans.
4. Place clean plastic sheeting on a flat, level surface near the sampling area, if possible, and place equipment to be used on the plastic; place the insulated cooler(s) on separate plastic sheeting. Cover all equipment and supplies with clean plastic sheeting when not in use.
5. A clean, decontaminated trowel, scoop, or spoon will be used for each sample collected. Other equipment may be used (e.g., shovels) if constructed of stainless steel.

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### 5.2 Collection

The following general steps must be followed when collecting surface soil samples:

1. Surface soil samples are normally collected from the least-contaminated to the most-contaminated areas. Stay outside a specific sampling location until all samples are collected at that location.
2. Document the sampling events, recording the information in the designated field logbook. Document any and all deviations from SOPs in the field logbook and include rationale for changes. See CDM Federal SOP 4-1.
3. Carefully remove stones, vegetation, snow, etc. from the sampling location surface.
4. Carefully remove the top 1 to 2 centimeters of exposed soil, sediment, or sludge before sample collection.
5. First collect sample portions or aliquots for volatile analyses as well as any other samples that would be degraded by aeration. Follow with collection of samples for other analyses.

#### 5.2.1 Method for Collecting Samples for Volatile Organic Compound (VOC) Analysis

The requirements for collecting grab samples of surface soil for VOCs or other samples degraded by aeration are as follows:

1. VOC samples shall be collected with the least disturbance possible.
2. VOC samples shall be collected as grab samples; however, the method of collection will vary from site to site, based on data quality objectives and the degree of known or suspected contamination.
3. Label the sample containers with the appropriate information. Secure the label, covering it with a piece of clear tape.
4. Use a clean stainless steel or Teflon-lined trowel or spoon (or tube) to collect sufficient material in one grab, over the required sampling interval, to fill the sample containers.

## SURFACE SOIL SAMPLING

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5. With the aid of a clean stainless steel spatula, quickly fill the sample containers directly from the sampling device, removing stones, twigs, grass, etc., from the sample. Fill the containers as full and compact as possible to minimize headspace.
6. Immediately secure the Teflon-lined caps on the sample container.
7. Wipe the containers clean with a clean Kimwipe or paper towel.
8. Place the containers in individual zip-top plastic bag(s) and seal the bag(s).
9. Pack all samples as required. Include properly completed documentation, and affix signed and dated custody seals to the cooler lid.

### 5.2.2 Method for Collecting Samples for Nonvolatile Organic or Inorganic Compound Analysis

The requirements for collecting samples of surface soil for nonvolatile organic or inorganic analyses are as follows:

1. Label each sample container with the appropriate information. Secure the label by covering it with a piece of clear tape.
2. Use a decontaminated stainless steel or Teflon-lined trowel or spoon to obtain sufficient sample from the required interval and subsampling points, if necessary, to fill the specified sample containers.
3. Empty the contents of each fill of the sampling device directly into a clean stainless steel or Teflon-lined tray or bowl.
4. Homogenize the sample by mixing with a spoon, spatula, or trowel.
5. Use the spoon, spatula, or trowel to distribute the uniform mixture into the labeled sample containers. Fill organic sample containers first, then inorganics.
6. Secure the appropriate cap on each container immediately after filling it.
7. Wipe the sample containers clean with a clean Kimwipe or paper towel.

## SURFACE SOIL SAMPLING

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8. Place sample containers in individual zip-top plastic bags and seal the bags.
9. Pack all samples as required. Include properly completed documentation, and affix custody seals to the cooler lid.
10. Decontaminate sampling equipment according to CDM Federal SOP 4-5.

### 6.0 RESTRICTIONS/LIMITATIONS

Grab sampling for VOC analysis or for analysis of any other compound(s) that may be degraded by aeration is necessary to minimize sample disturbance and, hence, analyte loss. The representativeness of this sample, however, is difficult to determine because the collected sample represents a single point, is not homogenized, and has been disturbed.

### 7.0 REFERENCES

U.S. Department of Energy, Hazardous Waste Remedial Actions Program, *Quality Control Requirements For Field Methods*, DOE/HWP-69/R1, July 1990.

U.S. Department of Energy, Hazardous Waste Remedial Actions Program, *Standard Operating Procedures For Site Characterizations*, DOE/HWP-100, July 1990.

U.S. Environmental Protection Agency, *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.



# PACKAGING AND SHIPPING OF ENVIRONMENTAL SAMPLES

SOP 2-5

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Date: June 30, 1994

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## 4.0 REQUIRED EQUIPMENT

- Coolers with return address of CDM Federal office
- Heavy-duty plastic garbage bags
- Plastic zip-top bags, small and large
- Clear Tape
- Fiber tape
- Duct tape
- Vermiculite
- Bubble wrap (optional)
- Ice
- Chain-of-Custody seals
- Completed Chain-of-Custody record or CLP custody records if applicable
- Completed Bill of Lading
- "This End Up" and directional arrow labels

## 5.0 PROCEDURES

The following steps must be followed when packing sample bottles and jars for shipment:

1. Select a sturdy cooler in good repair. Secure and tape the drain plug with fiber or duct tape. Line the cooler with a large heavy-duty plastic garbage bag.
2. Be sure the caps on all bottles are tight (will not leak); check to see that labels and chain-of-custody records are completed properly.
3. Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags. Up to three VOA vials may be packed in one bag. Bottles may be wrapped in bubble wrap. Optionally, place three to six VOA vials in a quart metal can and then fill the can with vermiculite.
4. Place two to four inches of vermiculite into the bag in the cooler and then place the bottles and cans in the bag with sufficient space to allow for the addition of more vermiculite between the bottles and cans. It is preferable to place glass sample bottles and jars into the cooler vertically. Due to the strength properties of a glass container, there is much less chance for breakage when the container is packed vertically rather than horizontally.

## PACKAGING AND SHIPPING OF ENVIRONMENTAL SAMPLES

SOP 2-5

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5. Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal. Place these ice bags on top of, or between, the samples. Several bags of ice are required for temperature control. Fill all remaining space between the bottles or cans with vermiculite. Securely fasten the top of the large garbage bag with fiber or duct tape.
6. Place the completed Chain-of-Custody Record or the CLP Traffic Report Form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag, tape the bag to the inner side of the cooler's lid, and then close the cooler.
7. Fiber tape shall be wrapped around each end of the cooler two times, and completed Chain-of-Custody seals affixed to the top opposite sides of the cooler, half on the fiber tape so that the cooler cannot be opened without breaking the seal. Complete two more wrap arounds with fiber tape; place clear tape over custody seals.
8. The shipping container lid must be marked "THIS END UP" and arrow labels which indicate the proper upward position of the container should be affixed to the cooler. A label containing the name and address of the shipper (CDM Federal) shall be placed on the outside of the container. Labels used in the shipment of hazardous materials (such as Cargo Only Air Craft, Flammable Solids, etc.) are not permitted to be on the outside of the container used to transport environmental samples and shall not be used. The name and address of the laboratory shall be placed on the container, or when shipping by common courier, the Bill of Lading shall be completed and attached to the lid of the shipping container.

### 6.0 RESTRICTIONS/LIMITATIONS

The holding times for the samples packed for shipment must not be exceeded. It is recommended that samples be packed in time to be shipped nightly for overnight delivery. Use caution when shipping samples for weekend delivery; make arrangements with laboratory before sending samples.

### 7.0 REFERENCES

U.S. Environmental Protection Agency, *Sampler's Guide to the Contract Laboratory Program*, EPA/540/P-90/006, December 1990.

U.S. Environmental Protection Agency, Region IV, *Standard Operating Procedures and Quality Assurance Manual*, February 1991.

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# FIELD LOGBOOK CONTENT AND CONTROL

SOP 4-1  
Revision: 2  
Date: January 5, 1995  
Page 1 of 6

Prepared: Donnie McCann 12/20/94  
Signature/Date

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Signature/Date

QA Review: Shay A. [Signature] 12/30/94  
Signature/Date

Approved: [Signature] 1/5/95  
Signature/Date

Issued: Rosemary Ellisick 1/5/95  
Signature/Date

## 1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to set CDM Federal criteria for content entry and form of field logbooks.

## 2.0 BACKGROUND

### 2.1 Definitions

Biota - The flora and fauna of a region.

Decontamination - To remove contaminants from field sampling equipment that might bias analytical results.

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians.

### 2.2 Discussion

Information recorded in field logbooks include observations, data, calculations, time, weather, description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

## 3.0 RESPONSIBILITIES

Field Team Leader (FTL) - The FTL is responsible for ensuring the nature and form of data entries are conducted in accordance with this procedure.

## FIELD LOGBOOK CONTENT AND CONTROL

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Site Personnel - All CDM Federal employees who make entries in field logbooks during on-site activities are required to read this procedure prior to engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance.

### 4.0 REQUIRED EQUIPMENT

- Site-specific plans
- Field notebook
- Indelible black or blue ink pen
- Ruler or similar scale (in some circumstances)

### 5.0 PROCEDURES

#### 5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with other pertinent CDM Federal and site SOPs. These should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation. These procedures should be located at the field office.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. Prior to use in the field, each logbook will be marked with a specific document control number issued by the document control administrator. The following information shall be recorded on the cover of the logbook:

- Field Logbook Document Control Number
- Activity (if the logbook is to be activity-specific)
- Name of CDM Federal contact and phone number(s)
- Start date

The first few (approximately five) pages of the logbook shall be reserved for a table of contents. Mark the first page with the heading and enter the following:

# FIELD LOGBOOK CONTENT AND CONTROL

SOP 4-1

Revision: 2

Date: January 5, 1995

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## TABLE OF CONTENTS

Date/Description	Page
(Start Date)/Reserved for TOC	1-5

The remaining pages of the Table of Contents will be designated as such with "TOC" written on the top center of each page.

### 5.2 Operation

The following is a list of requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information need not be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.
- Do not remove any pages from the book.
- Record as much information as possible.

Specific requirements for field logbook entries include:

- Initial and date each page
- Sign and date the final page of entries for each day
- Initial and date all changes
- Multiple authors must sign out the logbook by inserting the following:

Above notes authored by:

- (Sign name)

## FIELD LOGBOOK CONTENT AND CONTROL

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- (Print name)
- (Date)

- A new author must sign and print his/her name before additional entries are made
- Draw a diagonal line through the remainder of the final page at the end of the day
- Record the following information on a daily basis:
  - Date and time
  - Name of individual making entry
  - Names of field team and other persons on-site
  - Description of activity being conducted including station (i.e., well, boring, sampling location number) if appropriate
  - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personal protection to be used
  - Serial numbers of instruments
  - Required calibration information
  - Serial/tracking numbers on documentation (e.g., carrier airbills)

Entries into the field logbook shall be preceded with the time (written in military units) of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the logbook must reference the automatic data record or form.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.

## FIELD LOGBOOK CONTENT AND CONTROL

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- Problems, downtime, or delays
- Upgrade or downgrade of personal protection equipment

### 5.3 Post-Operation

To guard against loss of data due to damage or disappearance of logbooks, completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied and submitted regularly and as promptly as possible to the office. When possible, electronic media such as disks and tapes should be copied and forwarded to the office.

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated, and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

### 6.0 RESTRICTIONS/LIMITATIONS

Field logbooks constitute the official record of on-site technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM Federal personnel and their subcontractors. They are documents that may be used in court to indicate and defend dates, personnel, procedures, and techniques employed during site activities. Entries made in these notebooks should be factual, clear, precise, and as non-subjective as possible. Field logbooks, and entries within, are not to be utilized for personal use.

### 7.0 REFERENCES

Sandia National Laboratories, *Procedure for Preparing, Sampling and Analysis Plan, Site-Specific Sampling Plan, and Field Operating Procedures*, QA-02-03, Albuquerque Environmental Program Department 3220, Albuquerque, New Mexico, 1991.

Sandia National Laboratories, Division 7723, *Field Operation Procedure for Field Logbook Content and Control*, Environmental Restoration Department, Albuquerque, New Mexico, 1992.

**FIELD LOGBOOK CONTENT AND CONTROL**

SOP 4-1

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**THIS PAGE INTENTIONALLY BLANK TO CORRECT AN ERROR IN PAGE NUMBERING.** The total number of pages should have been 5. The procedure is complete in 5 pages.

# FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

SOP 4-5

Revision: 1

Date: June 30, 1994

Page 1 of 8

Prepared: Susan Flakus 8/3/94  
Name/Date

Technical Review: Peter C. Elledge 8/1/94  
Signature/Date

QA Review: Jeanette M. Fawcett 8/1/94  
Signature/Date

Approved: Paul M. Hunt 8/12/94  
Signature/Date

Issued: Rosemary Ellerick 8/19/94  
Signature/Date

## 1.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to describe the procedures required for decontamination of field equipment.

## 2.0 BACKGROUND

### 2.1 Definitions

Clean - Free of visible contamination and when decontamination has been completed in accordance with this SOP.

Cross-Contamination - The transfer of contaminants through equipment or personnel from the contamination source to less contaminated or noncontaminated samples or areas.

Decontamination - The process of rinsing or otherwise cleaning the surfaces of equipment to rid them of contaminants and to minimize the potential for cross contamination of samples or exposure of personnel.

### 2.2 Discussion

Decontamination of field equipment is necessary to ensure the quality of samples by preventing cross contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants off-site.

## 3.0 RESPONSIBILITIES

**Field Team Leader** - The Field Team Leader (FTL) ensures that field personnel are trained in the performance of this procedure and that decontamination is conducted in accordance with this procedure. The FTL may also be required to collect and document rinseate samples to provide quantitative verification that these procedures have been correctly implemented.

# FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

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## 4.0 REQUIRED EQUIPMENT

- High-pressure pump with soap dispenser or steam-spray unit (for large equipment only)
- Stiff-bristle scrub brushes
- 55-gallon drums
- Plastic buckets and troughs
- Laboratory-grade detergent (low phosphate)
- Nalgene or Teflon Sprayers or wash bottles or 2- to 5-gallon, manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Plastic sheeting
- Disposable wipes or rags
- Water, American Society for Testing and Materials (ASTM) type II or better, as defined by ASTM Standard Specification for Reagent Water, Standard D 1193-77 (reapproved 1983)
- Appropriate decontamination solutions pesticide grade or better and traceable to a source (e.g. 10% and/or 1% nitric acid ( $\text{HNO}_3$ ), acetone, methanol, isopropanol, hexane)
- Gloves, safety glasses, and other protective clothing as specified in the site-specific health and safety plan

## 5.0 PROCEDURES

All reusable equipment (non-dedicated) used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample. Decontamination of equipment will occur either at the central decontamination station or at portable decontamination stations set up at the sampling location, drill sites, or monitoring well locations. The centrally located decontamination station will include a pad on which the drill rigs and other large drilling equipment, such as auger flights, can be steam cleaned.

The decontamination pad will be constructed so that contaminated water drains into a collection system. Collected water will be pumped into 55-gallon drums or portable tanks for storage and, if necessary, treated before discharge to an onsite industrial waste treatment plant (IWTP) or manifested off site by a waste hauler if required. The water will be collected and the appropriate method of disposal will be determined. Also, decontamination fluids, such as solvents may need to be segregated from other investigation derived wastes. Disposal alternatives will be specified in the site-specific plans.

All items that will come into contact with potentially contaminated media will be decontaminated before use and between sampling and/or drilling locations. If decontaminated items are not immediately used, they will be covered either with plastic or aluminum foil depending on the size of the item. All decontamination procedures for the equipment being used are as follows:

# FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

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## General Guidelines

- Potable water will be of a known quality. Water from untested sources that may contain contaminants will not be used.
- Soap used in the soap and water rinse step will be a low phosphate detergent.
- Sampling equipment that has come into contact with oil and grease will be cleaned with methanol or other approved alternative to remove the oily material. This may be followed by a hexane rinse and then another methanol rinse. Check with regional or client requirements.
- Decontaminated equipment will be allowed to air dry before being used.
- Documentation for all cleaning will be recorded in the appropriate logbook.
- All solvents will be pesticide grade or better and traceable to a source. The corresponding lot numbers will be recorded in the appropriate logbook.
- Gloves, boots, safety glasses, and any other personnel protective clothing and equipment will be used as specified in the site-specific health and safety plan.

## 5.1 Heavy Equipment Decontamination

Heavy equipment includes drilling rigs and backhoes. Follow these steps when decontaminating this equipment:

1. Set up a decontamination pad that is large enough to fully contain the equipment to be cleaned. Use one or more layers of heavy plastic sheeting to cover the ground surface. All decontamination pads should be upwind of the area to be investigated.
2. With the rig in place, spray areas (rear of rig or backhoe) exposed to contaminated soils using a steam or a high-pressure sprayer. Be sure to spray down all surfaces, including the undercarriage. It is also good practice to clean the motor, hydraulic lift, oil fill, and fuel tank areas to avoid introducing contaminants to the work site.
3. Use brushes, and low phosphate detergent and potable water to remove dirt whenever necessary.

## FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

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4. Remove equipment from the decontamination pad and allow it to air dry before returning it to the work site.
5. Record equipment type, date, time, and method of decontamination in the appropriate logbook.
6. After decontamination activities are completed, collect all contaminated waste waters, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal. Liquids and solids must be drummed separately.

### 5.2 Downhole Equipment Decontamination

Downhole equipment decontamination includes hollow-stem augers, drill pipes, casings, screens, etc. Follow these steps when decontaminating this equipment:

1. Set up a centralized decontamination area, if possible. This area should be set up to contain contaminated rinse waters and to minimize the spread of airborne spray.
2. Set up a "clean" area upwind of the decontamination area to receive cleaned equipment for air drying. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed. All decontamination pads should be upwind of the area to be investigated.
3. Place the object to be cleaned on aluminum foil or plastic-covered wooden sawhorses or other supports.
4. Using low phosphate detergent and potable water in the high-pressure sprayer (or steam unit), spray the contaminated equipment. Aim downward to avoid spraying outside the decontamination area. Be sure to spray inside corners and gaps especially well. Use a brush, if necessary, to dislodge dirt.
5. If using soapy water, rinse the equipment using clean, potable water. If using steam, the rinse step is not necessary if the steam does not contain a detergent. If the steam contains a detergent, this final clean water rinse is required.
6. Using the manual-pump sprayer, rinse the equipment thoroughly with water (ASTM Type II or better).
7. Remove the equipment from the decontamination area and place in the clean area to air dry.

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8. Record equipment type, date, time, and method of decontamination in the appropriate logbook.
9. After decontamination activities are completed, collect all contaminated waste waters, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal. Liquids and solids must be drummed separately.

### 5.3 Sampling Equipment Decontamination

Sampling equipment includes split spoons, spatulas, and bowls used for sample homogenization that directly contact sample media. Follow these steps when decontaminating this equipment:

1. Set up a decontamination line on plastic sheeting. The decontamination line should progress from "dirty" to "clean" and end with an area for drying decontaminated equipment. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or the surfaces on which decontaminated equipment is to be placed.
2. Before washing, disassemble any items that might trap contaminants internally. Do not reassemble these items until decontamination is complete. Wash items thoroughly in a bucket of low phosphate detergent and potable water. Use a stiff-bristle brush to dislodge any clinging dirt.
3. Rinse the item in potable water. Rinse water should be replaced as needed, generally when cloudy.
4. Using a hand sprayer, wash bottles, or manual-pump sprayer, rinse the item with water (ASTM Type II or better).
5. If required by the site-specific plans, rinse the item with 10% nitric acid (for stainless steel, glass, plastic, and Teflon), or 1% nitric acid (for items made of low-carbon steel) followed by a water (ASTM Type II or better) rinse.

**NOTE:** Care should be taken not to get nitric acid on skin or clothing. This step should not be used unless required by sampling needs.

**CAUTION:** Do not allow nitric acid to contact methanol or hexane. Contain nitric acid waste separate from organic solvents.

6. If sampling for organic analytes, rinse the item with methanol or approved organic solvent.

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7. Rinse the item with water (ASTM Type II or better).
8. If polar organic compounds such as pesticides, polychlorinated biphenyls (PCBs), and fuels are to be sampled, rinse the item with hexane or approved alternatives, followed by a second methanol rinse. This step should not be used unless required by sampling needs.
9. Allow the item to air dry completely.
10. After drying, wrap the clean item in plastic wrap or in aluminum foil, shiny side out.
11. Record equipment type, date, time, and method of decontamination in the appropriate logbook.
12. After decontamination activities are completed, collect all contaminated waters, used solvents and acids, plastic sheeting, and disposable gloves, boots, and clothing. Place contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately. (Refer to site-specific plans for waste management requirements).

### 5.4 Pump Decontamination

Follow these steps when decontaminating pumps:

1. Set up the decontamination area and separate "clean" storage area using plastic sheeting to cover the ground, tables, and other porous surfaces. Set up three 55-gallon drums in a triangle. The two drums at the base of the triangle will be used to contain dilute (nonfoaming) soapy water and potable water. The drum at the apex will receive waste water. Place containers of water (ASTM Type II or better) adjacent to the waste drum on the same side as the potable water drum.
2. The pump should be set up in the same configuration as for sampling. Submerge the pump intake (or the pump, if submersible) and all downhole-wetted parts (tubing, piping, foot valve) in the soapy water of the first drum. Place the discharge outlet in the waste drum above the level of the waste water. Pump soapy water through the pump assembly until it discharges to the waste drum.
3. Move the pump assembly to the potable water drum while leaving discharge outlet in the waste drum. All downhole-wetted parts must be immersed in the potable water rinse. Pump potable water through the pump assembly until it runs clear.

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4. Move the pump intake to the distilled water can. Pump distilled water through the pump assembly. Usually, three pump-and-line-assembly volumes will be required.
5. Decontaminate the discharge outlet by hand following the steps outlined in Section 5.3.
6. Remove the decontaminated pump assembly to the "clean" area and allow it to air dry. Intake and outlet orifices should be covered with aluminum foil to prevent the entry of airborne contaminants and particles.
7. Record the equipment type, serial number, date, time, and method of decontamination in the appropriate logbook.

### 5.5 Instrument Probe Decontamination

Instrument probes used for field instruments such as pH meters, conductivity meters etc. will be decontaminated between samples and after use with ASTM type II, or better, water.

### 5.6 Waste Disposal

Refer to site-specific plans for waste disposal requirements. The following are guidelines for disposing of wastes:

1. All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as hazardous waste unless other arrangements are approved in advance.
2. Small quantities of decontamination solutions may be allowed to evaporate to dryness.
3. If large quantities of used decontamination solutions will be generated, it may be best to separate each type of waste in a separate container. This may permit the disposal of wash water and rinse water in a sanitary sewage treatment plant rather than as a hazardous waste. If an industrial waste water treatment plant is available onsite, the disposal of acid solutions and solvent-water solutions may be permitted.
4. Unless required, plastic sheeting and disposable protective clothing may be treated as a solid, nonhazardous waste.

# FIELD EQUIPMENT DECONTAMINATION AT NONRADIOACTIVE SITES

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## 6.0 RESTRICTIONS/LIMITATIONS

Nitric acid and polar solvent rinses are necessary only when sampling for metals or organics respectively. These steps should not be used unless required because of acid burn and ignitability hazards.

If the field equipment is not allowed to air dry properly before use, volatile organic residue which interferes with the analysis may be detected in the samples. The occurrence of residual organic solvents is often dependent on the time of year sampling is conducted; in the summer, volatilization is rapid and in the winter, volatilization is slow. Check with your EPA region, state and client for approved decontamination solvents.

## 7.0 REFERENCES

Department of Energy, Hazardous Waste Remedial Actions Program, *Standard Operating Procedures For Site Characterization*, DOE/HWP-100, July 1990.

Department of Energy, Hazardous Waste Remedial Actions Program, *Quality Control Requirements For Field Methods*, DOE/HWP-69/RI.

American Society for Testing and Materials. *Standard Practice for Decontamination of Field Equipment at Nonradioactive Waste Sites*, ASTM D5088-90, June 29, 1990.

U.S. Environmental Protection Agency, Region II, "*CERCLA Quality Assurance Manual*, Revision 1, 1989.

U.S. Environmental Protection Agency, Region IV, *Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual*, 1986.

U.S. Environmental Protection Agency, *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.1, 1987.

# CONTROL OF MEASUREMENT AND TEST EQUIPMENT

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Revision: 2  
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Prepared: [Signature] 12/21/94 Technical Review: [Signature] 12/21/94  
QA Review: [Signature] 12/29/94 Approved: [Signature] 1/4/95  
Issued: [Signature] 1/5/95  
Signature/Date Signature/Date Signature/Date

## 1.0 OBJECTIVE

The objective of this standard operating procedure is to establish the baseline requirements, procedures and responsibilities inherent to the control and use of all measurement and test equipment. Contractual obligations may require more specific or stringent requirements that must also be implemented.

## 2.0 BACKGROUND

### 2.1 Definitions

- CO - Corporate owned
- EC - Equipment Coordinator
- EL - Equipment Log
- EP - Equipment Procedure
- ESCM - Equipment Service Center Manager
- EWM - Equipment Warehouse Manager
- GF - Government furnished
- M&TE - Measurement and test equipment
- M&C - Maintenance and calibration
- Traceability - The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification.

### 2.2 Discussion

To ensure the accuracy of measurement and test results, corporate owned and government furnished measurement and test equipment must be utilized in full compliance with the requirements for:

- Operating, maintaining and calibrating according to the manufacturer's procedures where appropriate
- Preparing and attaching, or including, Equipment Procedures and Equipment Logs
- Shipping
- Record keeping
- The traceability of calibration standards
- Removing an item from use if it cannot be calibrated or adjusted to perform accurately

Measurement and test equipment leased or rented from an outside vendor must also be utilized in full compliance with the requirements stated above except that Equipment Procedures and Equipment Logs will not be prepared or attached.

### 2.3 Associated Procedures

- CDM Federal Equipment Procedures (EPs)
- Manufacturer's operating, maintenance and calibration procedures

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## 3.0 RESPONSIBILITIES

All staff with responsibility for the control of M&TE and all users of M&TE are responsible for implementing the requirements contained herein.

### 3.1 M&TE Users Responsibilities

- Follow the EPs when using CO and GF M&TE.
- Specify that the manufacturer's operating, M&C procedures, latest calibration record and standards certification are included when requesting M&TE leased or rented from an outside vendor.
- Follow the manufacturer's operating and M&C procedures when using M&TE rented or leased from an outside vendor.
- Use appropriate calibration standards as specified.
- Ensure that measurements are valid by checking post run calibration or field checks.
- Make proper entries into the EL and document calibration, use and service.
- Make proper entries into the Field Log as specified in the project-specific controlling documents.
- Periodically review M&TE results and report all non-conforming items and take appropriate corrective action as required.

### 3.2 ESCM Responsibilities

For M&TE for which the ESCM is directly responsible, the ESCM shall also:

- Prepare EPs and ELs
- Ensure that EPs and ELs are attached to, or included with, M&TE
- Label M&TE items requiring calibration
- Affix a calibration label on M&TE when it is calibrated
- Ensure that M&TE is maintained as required
- Ensure that M&TE is calibrated to the appropriate standards as specified
- Consume or dispose of standards on or before the expiration date
- Maintain M&TE records
- Periodically review M&TE records and report all non-conforming items and take appropriate corrective action as required

### 3.3 EWM and EC Responsibilities

For M&TE for which the EWM and EC are directly responsible, the EWM and the EC shall:

- Ensure that EPs and ELs are attached to, or included with, M&TE
- Label items of M&TE requiring calibration
- Affix a calibration label on M&TE when it is calibrated
- Ensure that M&TE is maintained as required
- Ensure that M&TE is calibrated to the appropriate standards as specified
- Consume or dispose of standards on or before the expiration date
- Maintain M&TE records
- Periodically review M&TE records and report all non-conforming items and take appropriate corrective action as required

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## 4.0 GENERAL REQUIREMENTS

CO and GF M&TE shall not be used or shipped unless an EP and an EL have been prepared and attached to the shipping case, or included with the item. M&TE rented or leased from an outside vendor shall not be used or shipped unless the manufacturer's operation, M&C procedures are included with the item.

### 4.1 Operating Documents

The manufacturer's operating documentation will be obtained for each M&TE item. Normally the documentation includes standard operating procedures and any maintenance and calibration requirements.

### 4.2 Prepare and Attach (or Include) an Equipment Procedure

An EP will be prepared and attached to the shipping case (or included) with each item of CO and GF M&TE. Some or all of the following information, as appropriate to the M&TE, will be included in the EP:

- Applications
- Initial calibration tolerance
- Field check acceptance range
- Safety considerations
- Start-up procedure
- Field check procedure
- ESC calibration procedure
- Calibration standards
- Post run calibration tolerance
- Maintenance frequency
- Limitations of use
- Operating procedure
- Field calibration procedure
- ESC maintenance procedure
- Calibration Frequency
- Calibrated instrument range
- Measurement type
- Interferences
- Shutdown procedure
- Field maintenance procedure

For M&TE rented or leased from an outside vendor - the manufacturers operating, maintenance and calibration documents must accompany each item.

### 4.3 Prepare and Attach (or Include) an Equipment Log

An EL will be prepared and attached to the shipping case (or included) with each item of CO and GF M&TE. The following items will be entered into the EL each time the equipment is serviced or calibrated.

- The date
- The name of the item
- The Property Control Number (if applicable)
- The project number
- The calibration standard used
- The lot number of the calibration standard
- The standards pre-calibration reading
- Any notable incidents that may apply or contribute to the proper calibration, repair or decontamination of the instrument
- The time of the entry
- The serial number
- The name of the person making the entries
- The description of activity (or project)
- The concentration of the calibration standard
- The expiration of the calibration standard
- The standards post calibration reading
- The date and signature of the person making the entries after the final entry.

For M&TE rented or leased from an outside vendor - the information will be recorded in the Field Log as specified in the project-specific controlling documents.

# CONTROL OF MEASUREMENT AND TEST EQUIPMENT

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## 4.0 GENERAL REQUIREMENTS (continued)

### 4.4 Record Keeping

CO and GF M&TE shall have a complete "cradle to grave" record established and maintained. By category, the following records are to be included in each respective M&TE item file:

- Manufacturer's operating procedures
- Non-conforming (and other pertinent) reports
- Calibration standards certifications
- Maintenance and calibration records
- Shipping and receiving documents
- Miscellaneous: any pertinent document that does not readily fit in a defined category

For M&TE rented or leased from an outside vendor - procurement and receipt records shall be maintained by procurement staff, M&C actions performed by CDM Federal staff shall be recorded and maintained in the Field Log, non-conformance reports will be recorded and filed according to the CDM Federal Quality Procedures.

### 4.5 Calibration Requirements

For CO and GF M&TE - calibration must be performed in accordance with the EP, or project specific traceability requirements, using standards that are ultimately traceable to nationally recognized standards (where they exist) and/or to a commercially available standard. The calibration may be performed by CDM Federal personnel or by an appropriately qualified outside source. Calibration performed by an outside vendor must include documentation of traceability to a nationally recognized standard if required and/or to a commercially available standard.

For M&TE that is rented or leased from an outside vendor - calibration must be performed in accordance with the manufacturer's procedures using standards that are ultimately traceable to a nationally recognized standard (where they exist) or commercially available standards. The calibration may be performed by CDM Federal personnel or by an appropriately qualified outside source. Calibration performed by outside vendor must include documentation of traceability.

### 4.6 Label M&TE Requiring Calibration

Items of CO and GF M&TE that require calibration immediately before use shall have a label affixed to them stating "Calibrate Before Use." Items of CO and GF M&TE that are calibrated at scheduled intervals shall have a calibration label attached listing the date of the calibration, the date the M&TE is next due for calibration and the initials of the person performing the calibration. M&TE that is rented or leased from an outside vendor do not require labeling, but shall include the record of the most recent calibration and the standards certification.

### 4.7 Non-conforming M&TE

Any item of M&TE that cannot be calibrated or adjusted to perform accurately, or cannot be used in accordance with the manufacturer's standard operating, or M&C requirements is a non-conforming item and may not be used. Items that are determined to be non-conforming shall be handled in accordance with the appropriate Quality Procedure.

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## 5.0 PROCEDURES

### 5.1 Obtain the Operating Documents

The following procedure must be followed by the requisitioner whenever M&TE is acquired, rented or leased from an outside vendor:

1. For CO and GF M&TE - specify that the manufacturer's operating and M&C procedures be included.
2. For M&TE that is rented or leased from an outside vendor- specify that the manufacturer's operating and M&C procedures, latest calibration record and standards certification be included.

### 5.2 Prepare and Attach or Include an Equipment Procedure and an Equipment Log

The following procedures must be followed whenever CO and GF M&TE are acquired:

1. Recipient - notify the ESCM of receipt of an M&TE item.
2. ESCM - obtain the appropriate manufacturer's operating manual and/or instructions.
3. ESCM - prepare an EP and an EL and obtain appropriate approvals.
4. ESCM - attach the completed EP and/or EL to the shipping case, or include it when shipping an item of M&TE that does not have a shipping case. Or, send the EP and/or EL to the M&TE recipient directing them to either, attach it to the shipping case or include it when shipping an item that does not have a shipping case.

### 5.3 Operating, Maintaining or Calibrating an M&TE Item

Operate, maintain or calibrate all M&TE items in accordance with the EP, or manufacturers operating procedures, as appropriate.

### 5.4 Shipment

The following procedures are to be followed whenever M&TE is shipped:

1. For CO and GF M&TE - inspect the item to ensure that the EP and the EL, is complete and attached to the shipping case, or included if the item has no shipping case.
2. For M&TE that is rented or leased from an outside vendor - inspect the item to ensure that the manufacturer's operating procedures, M&C procedures and latest calibration and standards certification records are included prior to shipment.
3. For CO and GF M&TE - if an EP and/or EL is missing or incomplete - do not ship the item, immediately contact the ESCM and request a new one.
4. For M&TE that is rented or leased from an outside vendor - if any documentation is missing or incomplete - do not ship the item, contact Procurement and request that they obtain the documentation from the vendor.

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## 5.5 Record Keeping

For CO and GF M&TE the following steps must be followed when establishing and maintaining records:

1. Create an equipment file upon the initial receipt of M&TE.
2. Maintain the files by M&TE item and keep all files in a cabinet or drawer at the pertinent warehouse or office location. Organize the files by contract or service center origin.
3. Maintain all original documents in the equipment file except for the packing slip and Field Log.
4. Forward the original packing slip to Procurement and a photocopy to the ESCM, the EWM or the EC (whomever of these individuals is the responsible party for the M&TE item.)
5. File the photocopy of the packing slip in the M&TE file.
6. File the Field Log in accordance with the technical standard operating procedure for Field Log use.

For M&TE rented or leased from an outside vendor, the following steps must be followed when establishing and maintaining records:

1. Forward the packing slip to Procurement.
2. Maintain M&TE records in the Field Log.
3. File the Field Log in accordance with the technical standard operating procedure for Field Log use.
4. Maintain all M&C records and standards certifications in the project file.
4. Retain the most current M&C record and standards certification with the M&TE item.
5. Forward all other M&C records and standards certifications to the appropriate Project Manager.

## 5.6 Traceability of Calibration Standards

The following steps must be taken to ensure the traceability of calibration standards:

1. Procure calibration standards to a nationally recognized standard as specified or required.
2. Procure calibration standards to commercially available standards when not otherwise specified or required.
2. Obtain certifications for calibration standards.
3. Note standards that are perishable and consume, or dispose of, them on or before the expiration date.

## 5.7 M&TE That Fails Calibration

The following steps must be followed if an M&TE item cannot be calibrated or adjusted to perform accurately:

1. Immediately discontinue use and notify the appropriate Project Manager as well as the ESCM, EWM, or EC responsible for that M&TE item.

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## 5.7 M&TE That Fails Calibration (continued)

2. Report the item as non-conforming and take appropriate action in accordance with the quality procedure for non-conforming items.
3. ESCM, EWM, EC, or user responsible for that M&TE item - review the current and previous M&C records to determine if the validity of previous M&T results could have been affected.
4. ESCM, EWM, EC and user responsible for that M&TE item - notify the appropriate Project Manager(s) if a potential negative impact is determined.
5. ESCM, EWM, or EC responsible for M&TE items - review M&C records for those items annually, or more frequently if required, to determine if problematic trends are evident. Take appropriate mitigating action when problematic trends are evidenced.

## 6.0 RESTRICTIONS/LIMITATIONS

On an item by item basis, exemptions from the requirements of this Standard Operating Procedure may be granted by the Headquarters Administrative Manager with the concurrence of appropriate Headquarters Health and Safety and/or Quality Assurance staff. All exemptions from this Standard Operating Procedure shall be documented by the Headquarters Administrative Manager and included in the equipment records as appropriate.

## 7.0 REFERENCES

- CDM Federal Programs Corporation Quality Assurance Manual.
- CDM Federal Programs Corporation Property Control Manual.
- CDM Federal Programs Corporation Technical Standard Operating Procedures.

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**APPENDIX F**  
**HEALTH AND SAFETY PLAN**

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HEALTH AND SAFETY PLAN FORM

CDM Federal Health and Safety Program

CDM FEDERAL PROGRAMS CORPORATION

PROJECT DOCUMENT NO.: 6110-015-HS

PROJECT NAME 1100-EM-1 OPERABLE UNIT - SOILS REMOVAL ACTIVITIES

Contract No.: DACW68-94-D-0001

JOBSITE ADDRESS

CLIENT U.S. Army Corps of Engineers -WALLA WALLA DISTRICT

Horn Rapids Road, Northeast of the Siemens Power Corporation, Richland, WA

DELIVERY ORDER NO.: 015

SITE CONTACT TBA

CLIENT CONTACT Randy Chong

PHONE NO. TBA Mobile Phone

PHONE NO. 1-509-522-6774

( ) AMENDMENT NO. TO EXISTING APPROVED HSP - DATE EXISTING APPROVED HSP

OBJECTIVES OF FIELD WORK:

Excavate contaminated soils based on the findings of previous investigations (conducted by others). Collect and analyze screening samples to guide the excavation process. Collect and analyze samples intended to confirm completion of the removal of contaminated materials. Stage and secure contaminated materials onsite.

TYPE: Check as many as applicable

(X) Active

(X) Landfill

( ) Unknown

( ) Inactive

( ) Uncontrolled

( ) Military

(X) Secure

(X) Industrial

(X) Other specify:

( ) Unsecure

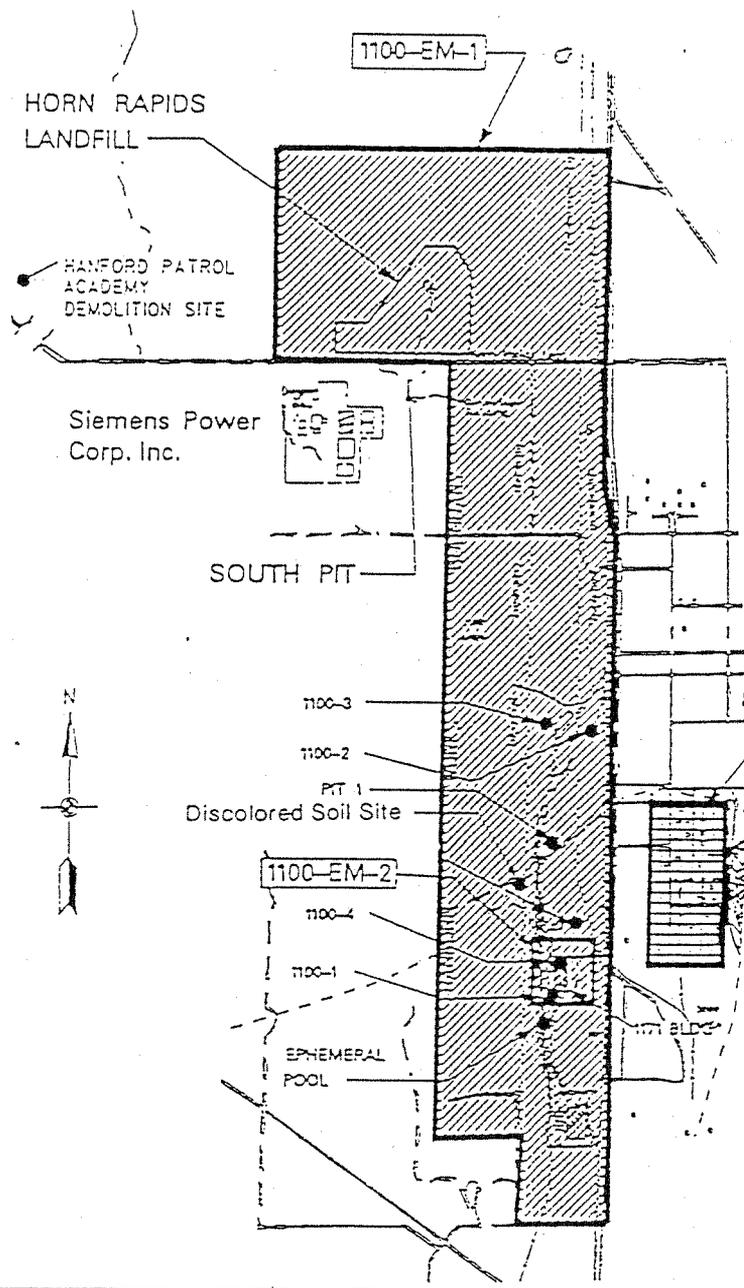
( ) Recovery

U.S GOVERNMENT  
(DOE)

( ) Enclosed space

( ) Well Field

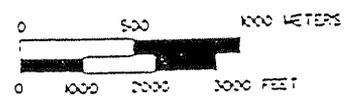
Location of the 1100 Area Operable Units and Sites



1100 AREA

Outline and Designation of Operable Units

1100-3 ● Subunit Location and Designation



If contamination is not encountered during excavation/trenching activities these work zones will not be established.

Establishment of work zones will be completed in consultation with the onsite U.S Army Corps of Engineers Site Safety Coordinator.

See Figure 11-1 of the USACE 1100 Area RD/JRA Site Safety and Health Plan (Attachment 1).

Support Zone

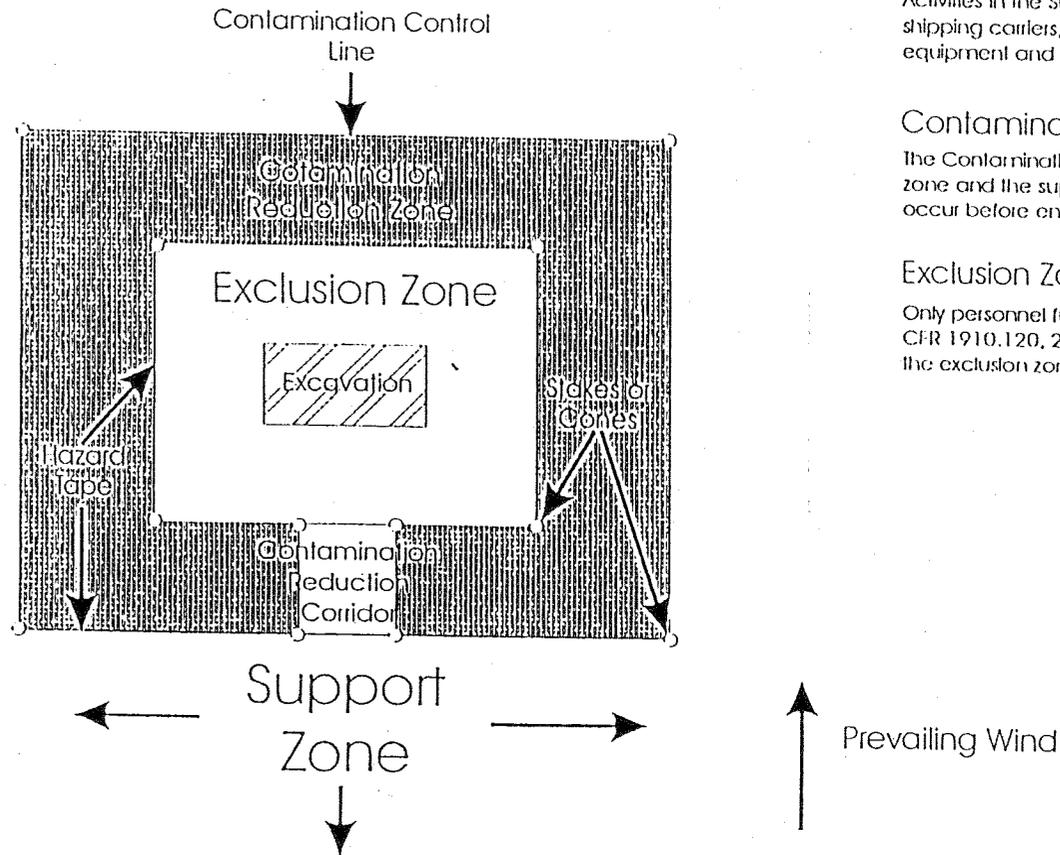
Activities in the Support Zone may include pre-entry briefings, transfer of packages to shipping carriers, field coordination efforts, logging in and out, storage of support equipment and supplies, donning of PPE, and documentation.

Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is a buffer zone between the exclusion zone and the support zone where decontamination and doffing of PPE must occur before entering the support zone.

Exclusion Zone

Only personnel fulfilling health and safety training requirements (including 29 CFR 1910.120, 29 CFR 1910.134 and 29 CFR 1910.1200) will be allowed in the exclusion zone



DESCRIPTION AND FEATURES:

The Hanford Site is a 150,000 ha (560 square miles) reservation which has been operated by the federal government since 1943. The primary mission of the Hanford Site has been plutonium production for military use and nuclear energy research and development. The Hanford Site is located along the Columbia River in southeastern Washington and includes portions of Benton, Grant, Franklin, and Adams counties. The 1100 Area, which is adjacent to the City of Richland in Benton County, is the southeastern-most portion of and is the main portal to the Hanford Site. This health and safety plan addresses work that will be performed at the Discolored Soil Site, Ephemeral Pool Site and Horn Rapids Landfill Site located within the 1100 area.

**Discolored Soil Site:** This is an area where it is believed that one or more containers of bis(2-ethylhexyl)phthalate (BEHP) were either spilled or emptied without authorization. The site lies approximately 2,000 feet northwest of Building 1171 and encompasses an east-west trending depression. Previous investigations identified visibly stained soil covering about 6 by 10 feet on the eastern end of the depression. Samples collected from the surface soil at the site contained BEHP at a maximum concentration of 25,000 mg/kg. The extent of contamination with depth and the areal limits of contamination have not been defined.

**Ephemeral Pool Site:** This site is a 20 by 700 foot manmade depression on the western side of the building 1171 parking lot. The pool collected runoff water from the parking lot for discharge to a central culvert. However, water has been observed to collect in the pool and evaporate or infiltrate into the soil. Previous investigations have identified the presence of PCBs in the surface soil at a maximum concentration of 42 mg/kg. The extent of contamination with depth and the areal limits of contamination have not been identified.

**Horn Rapids Landfill Site:** This site covers approximately 50 acres northeast of the Siemens Power Corporation (SPC) and north of Horn Rapids Road. The land fill was operated as an uncontrolled (reportedly nonradioactive waste) landfill for Hanford Operations from the late 1940s until the 1970s. Office and construction waste, asbestos wastes, sewage sludge, and fly ash are known to have been disposed of in the landfill. Previous investigations have identified asbestos contamination and an area contaminated by PCBs. PCBs are the only contamination requiring remediation in this area. The asbestos contaminated sections of the landfill are to be contained in place and capped (by others).

SURROUNDING POPULATION: ( ) Residential (X) Industrial ( ) Rural ( ) Urban ( ) OTHER:

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HISTORY:

The primary mission of the Hanford Site has been plutonium production for military use and nuclear energy research and development. The 1100 Area was placed on the National Priorities List (NPL), in July, 1989. For NPL purposes, the 1100 Area has been divided into four Operable Units: EM-1, EM-2, EM-3, and IU-1. Each of these Operable Units include areas (subunits) where there have been suspected or confirmed releases of hazardous materials to the environment.

Refer to the attached Health and Safety Plan for the 1100 Area RD/RA (prepared by the Corps of Engineers) for specific details

CDM Federal will initiate excavation and soil removal activities at the 1100-EM-1 Operable Unit.

- Horn Rapids Landfill Site
- Discolored Soil Site
- Ephemeral Pool Site

WASTE TYPES: ( ) Liquid (x) Solid (X) Sludge ( ) Gas ( ) Unknown ( ) Other specify: Landfill Wastes

WASTE CHARACTERISTICS: Check as many as applicable.

- (X) Corrosive ( ) Flammable ( ) Radioactive
- (X) Toxic ( ) Volatile ( ) Reactive
- ( ) Inert Gas ( ) Unknown ( ) Other specify:

WORK ZONES:

Delineation of exclusion zone (the contaminated job area), Contamination reduction zone (the area where decontamination takes place), and support zone (the uncontaminated area where workers should not be exposed to hazardous conditions) will be based on previous investigations sampling results and on potential routes and amount of contamination dispersion in the event of a release. Movement of personnel and equipment among these zones will be minimized and restricted to Specific Access Control Points to prevent cross contamination from contaminated areas to clean areas.

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HAZARDS OF CONCERN:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Heat Stress( attach guidelines) | <input checked="" type="checkbox"/> Noise                |
| <input checked="" type="checkbox"/> Cold Stress (attach guidelines) | <input checked="" type="checkbox"/> Inorganic Chemicals  |
| <input type="checkbox"/> Explosive/Flammable                        | <input checked="" type="checkbox"/> Organic Chemicals    |
| <input type="checkbox"/> Oxygen Deficient                           | <input checked="" type="checkbox"/> Motorized Traffic    |
| <input type="checkbox"/> Radiological                               | <input checked="" type="checkbox"/> Heavy Machinery      |
| <input type="checkbox"/> Biological                                 | <input checked="" type="checkbox"/> Slips, Trips & Falls |
| <input type="checkbox"/> Other specify:                             |  |

PRINCIPAL DISPOSAL METHODS AND PRACTICES:

The Discolored Soil Site is an area where it is believed that one or more containers of bis(2-ethylhexyl)phthalate (BEHP) were either spilled or emptied without authorization.

The Ephemeral Pool, located adjacent to a parking lot for building 1171, collected runoff water from the area for discharge to a central culvert. Water at this location would infiltrate into the soil or evaporate. PCBs were detected during a previous investigation of the 1100 area.

The Horn Rapids Landfill Site covers approximately 50 acres and was operated as an uncontrolled landfill for Hanford operations from the late 1940s until the 1970s. It is reported that wastes were non-radioactive. The landfill was reportedly used for the disposal of construction and office wastes, asbestos wastes, sewage sludge, and fly ash. An inventory of disposal/cell contents was proposed for the 1100 Area RI/FS. PCBs have been identified as the primary contaminant of concern at this site. Areas containing asbestos will be contained and capped in place (by others).

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HAZARDOUS MATERIAL SUMMARY: Circle waste type and estimate amounts by category

CHEMICALS Amounts/Units: mg/Kg	SOLIDS Amounts/Units: mg/Kg	SLUDGES Amounts/Units:	SOLVENTS Amounts/Units:	OILS Amounts/Units: mg/Kg	OTHER Amounts/Units:
Acids  Pickling Liquors Caustics Pesticides Chlordane 2.8 mg/Kg Heptachlor 0.02 mg/Kg 4,4-DDT .52 mg/Kg 4,4-DDE 1.2 mg/Kg  Dyes/Inks  Cyanides  Phenols Halogens Dioxins Other  Specify: bis(2-ethylhexyl)phthalate -25,000 mg/kg in surface soil.  B-hexachlorocyclohexane (Beta-HCH) 94 mg/Kg	Flyash Unknown  Asbestos Unknown Milling/Mine Tailings Ferrous Smelter  Non-ferrous Smelter  Metals Beryllium 0.85 mg/Kg Vanadium 87.5 mg/Kg Other Specify:	Paint  Pigments Metal Sludges POTW Sludge  Aluminum  Distillation Bottoms  Other Specify:	Halogenated (chloro, bromo) Solvents  Hydrocarbons  Alcohols  Ketones  Esters  Ethers  Other Specify:	Oily Wastes  Gasoline Diesel Oil Lubricants  PCBs Detected at 100 mg/Kg in Surface Soils  Polynuclear Aromatics  Other Specify:	Laboratory  Pharmaceutical Hospital Radiological  Municipal  Construction  Munitions Other Specify:

OVERALL HAZARD EVALUATION: ( ) High (X) Medium ( ) Low ( ) Unknown

JUSTIFICATION: Based upon concentrations identified during previous investigations.

FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

BACKGROUND REVIEW: (X) COMPLETE ( ) INCOMPLETE

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KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION (specify units and media)	PEL/TLV ppm or mg/m <sup>3</sup> (specify)	IDLH ppm or mg/m <sup>3</sup> (specify)	WARNING CONCENTRATION ppm	SYMPTOMS/EFFECTS OF ACUTE EXPOSURE	PHOTOIONIZATION POTENTIAL
PCBs (1242/1254) CAS[53469-21-9]	100,000 mg/kg in surface soil	0.001 mg/m <sup>3</sup> (TWA-NIOSH)	10 mg/m <sup>3</sup> 5 mg/m <sup>3</sup> respectively	NA	If ingested carcinogenic; toxic Acute Skin Irritation/Chloroacne, Irritation to eyes, nose, and throat	NA
bis(2-ethylhexyl)phthalate CAS[117-81-7]	25,000 mg/kg in surface soil	1.0 mg/mS (TWA OSHA) 5 mg/m <sup>3</sup> (PEL)	10 mg/m <sup>3</sup> (NIOSH)	Visible Dust	Confirmed carcinogen with experimental carcinogenic and tumorigenic data and experimental teratogen data. Other experimental reproductive effects. Poison by intravenous route. Human Systemic effects by ingestion: gastrointestinal tract effects. A mild skin and eye irritant.	NA
Heptachlor CAS [76-44-8]	.02 mg/Kg in surface soils	0.5 mg/m <sup>3</sup> (TW-OSHA)	35 mg/m <sup>3</sup> (NIOSH)	0.02 ppm	Carcinogenic, Tremors, Convulsions, Liver Damage	NA
Chlordane CAS [57-74-9]	2.8 mg/Kg in surface soils	TWA 0.5 mg/m <sup>3</sup>	500 mg/m <sup>3</sup>	NA	Blurred vision, ataxia, delirium, cough, nausea, vomiting,	NA
Beta-HCH	0.084 mg/Kg in surface soils	Unknown	Unknown	Unknown	Unknown	NA
4,4-DDT CAS [50-29-3]	0.520 mg/Kg in surface soils	1 mg/m <sup>3</sup> (TWA - OSHA)	500 mg/m <sup>3</sup>	2.9 mg/m <sup>3</sup>	Tremors, Headache, fatigue, irritation to skin and eyes	NA
4,4-DDE CAS [72-55-9]	1.2 mg/Kg in surface soils	Unknown	Unknown	Unknown	Similar to DDT	NA
Beryllium CAS [7440-41-7]	0.85 mg/Kg in surface soils	0.002 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	NA	Respiratory problems, weak, fatigue, weight loss, carcinogenic	NA
Vanadium (Value as Vanadium pentoxide dust CAS [1314-62-1])	87.3 mg/Kg in surface soils	0.5 mg/m <sup>3</sup>	70 mg/m <sup>3</sup>	0.5-2.2 mg/m <sup>3</sup>	Irritation eyes, green tongue, eczema, cough, nausea, void, irritation throat	NA

NA = Not Available      NE = None Established      U = Unknown

S = Soil      SW = Surface Water      T = Tailings      W = Waste      Tk = Tanks      SD = Sediment  
 A = Air      GW = Groundwater      SL = Sludge      D = Drums      L = Lagoons      OFF = Offsite

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FIELD ACTIVITIES COVERED UNDER THIS PLAN				HAZARD		
TASK DESCRIPTION/SPECIFIC TECHNIQUE-STANDARD OPERATING PROCEDURES/SITE LOCATION	Type	Primary	Contingency	SCHEDULE		
1 Visual Inspection, and oversight of excavation activities	Intrusive	A B C <u>D</u>	A B <u>C</u> D	Hi	Med	<u>Low</u>
	Non-intrusive	Modified	Exit Area	1-23-95		
2 Soil sampling (No. of Samples unknown)	Intrusive	A B C <u>D</u>	A B <u>C</u> D	Hi	Med	<u>Low</u>
	Non-intrusive	Modified	Exit Area	1-23-95		
3	Intrusive	A B C D	A B C D	Hi	Med	Low
	Non-intrusive	Modified	Exit Area			
4	Intrusive	A B C D	A B C D	Hi	Med	Low
	Non-intrusive	Modified	Exit Area			
5	Intrusive	A B C D	A B C D	Hi	Med	Low
	Non-intrusive	Modified	Exit Area			
6	Intrusive	A B C D	A B C D	Hi	Med	Low
	Non-intrusive	Modified	Exit Area			

PERSONNEL\* AND RESPONSIBILITIES

NAME	FIRM/REGION	CDM Federal HEALTH CLEARANCE	RESPONSIBILITIES	ONSITE?
Project Manager Paul Karas	CDM FPC/WED	CS	WORK ASSIGNMENT MGR	<u>1-2</u> -3-4
Site Health and Safety Coordinator TBD	CDM FPC/WED	CS	SITE HEALTH & SAFETY COORDINATOR	<u>1-2</u> -3-4
TBD			ALTERNATE SITE H&S COORDINATOR	<u>1-2</u> -3-4
TBD			STAFF	<u>1-2</u> -3-4
Clyde Burdine, Owner/Supervisor			Excavation Subcontractor	<u>1-2</u> -3-4
				1-2-3-4
				1-2-3-4

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PROTECTIVE EQUIPMENT:

BLOCK A      TASKS: 1-2 - 3 - 4 - 5 - 6      (X) Primary  
 LEVEL: A - B - C D - Modified      ( ) Contingency

BLOCK B      TASKS: 1-2 - 3 - 4 - 5 - 6      ( ) Primary  
 LEVEL: A - B C - D - Modified      (X) Contingency

Respiratory: (X) Not Needed  
 ( ) SCBA, Airline:  
 ( ) APR:  
 ( ) Cartridge:  
 ( ) Escape Mask:  
 ( ) Other:  
 Head and Eye: ( ) Not Needed  
 ( ) Safety Glasses:  
 ( ) Face Shield:  
 ( ) Goggles:  
 (X) Hard Hat:  
 (X) Other: Hearing Protection (> 85 dB)  
 Boots: ( ) Not Needed  
 (X) Boots: Leather steel-toed work boots  
 (X) Overboots:(Latex)  
 ( ) Rubber:

Prot. Clothing: ( ) Not Needed  
 ( ) Encapsulated Suit:  
 ( ) Splash Suit:  
 ( ) Apron  
 (X) Tyvek Coverall:  
 ( ) Saranex Coverall:  
 ( ) Cloth Coverall:  
 ( ) Other:  
 Gloves: ( ) Not Needed  
 ( ) Undergloves:  
 (X) Gloves: Surgical (Latex)  
 ( ) Overgloves:  
 (X) Other - specify below:  
 Dust Control Measures

Respiratory: ( ) Not Needed  
 ( ) SCBA, Airline:  
 (X) APR: MSA Ultra Twin  
 (X) Cartridge: Type MSA GMC-H  
 ( ) Escape Mask:  
 ( ) Other:  
 Head and Eye: ( ) Not Needed  
 ( ) Safety Glasses:  
 ( ) Face Shield:  
 ( ) Goggles:  
 (X) Hard Hat:  
 (X) Other: Hearing Protection (> 85 dB)  
 Boots: ( ) Not Needed  
 (X) Boots: Leather steel-toed work boots  
 (X) Overboots: (Latex)  
 ( ) Rubber:

Prot. Clothing: ( ) Not Needed  
 ( ) Encapsulated Suit:  
 ( ) Splash Suit:  
 ( ) Apron  
 (X) Tyvek Coverall: tapered wrists & ankles  
 ( ) Saranex Coverall:  
 ( ) Cloth Coverall:  
 ( ) Other:  
 Gloves: ( ) Not Needed  
 ( ) Undergloves:  
 (X) Gloves: Surgical (Latex)  
 (X) Overgloves: Neoprene or nitrile  
 (X) Other - specify below:  
 Dust Control Measures

BLOCK C      TASKS: 1 - 2 - 3 - 4 - 5 - 6      ( ) Primary  
 LEVEL: A - B - C - D - Modified      ( ) Contingency

BLOCK D      TASKS: 1 - 2 - 3 - 4 - 5 - 6      ( ) Primary  
 LEVEL: A - B - C - D - Modified      ( ) Contingency

Respiratory: ( ) Not Needed  
 ( ) SCBA, Airline:  
 ( ) APR:  
 ( ) Cartridge:  
 ( ) Escape Mask:  
 ( ) Other:  
 Head and Eye: ( ) Not Needed  
 ( ) Safety Glasses:  
 ( ) Face Shield:  
 ( ) Goggles:  
 ( ) Hard Hat:  
 ( ) Other:  
 Boots: ( ) Not Needed  
 ( ) Boots: Leather steel-toed work boots  
 ( ) Overboots:  
 ( ) Rubber:

Prot. Clothing: ( ) Not Needed  
 ( ) Encapsulated Suit:  
 ( ) Splash Suit:  
 ( ) Apron  
 ( ) Tyvek Coverall:  
 ( ) Saranex Coverall:  
 ( ) Cloth Coverall:  
 ( ) Other:  
 Gloves: ( ) Not Needed  
 ( ) Undergloves:  
 ( ) Gloves:  
 ( ) Overgloves:  
 ( ) Other - specify below:

Respiratory: ( ) Not Needed  
 ( ) SCBA, Airline:  
 ( ) APR:  
 ( ) Cartridge:  
 ( ) Escape Mask:  
 ( ) Other:  
 Head and Eye: ( ) Not Needed  
 ( ) Safety Glasses:  
 ( ) Face Shield:  
 ( ) Goggles:  
 ( ) Hard Hat:  
 ( ) Other:  
 Boots: ( ) Not Needed  
 ( ) Boots: Leather steel-toed work boots  
 ( ) Overboots:  
 ( ) Rubber:

Prot. Clothing: ( ) Not Needed  
 ( ) Encapsulated Suit:  
 ( ) Splash Suit:  
 ( ) Apron  
 ( ) Tyvek Coverall:  
 ( ) Saranex Coverall:  
 ( ) Cloth Coverall:  
 ( ) Other:  
 Gloves: ( ) Not Needed  
 ( ) Undergloves:  
 ( ) Gloves:  
 ( ) Overgloves:  
 ( ) Other - specify below:

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MONITORING EQUIPMENT: Specify by task. Indicate type as necessary. Attach additional sheets as necessary.

INSTRUMENT	TASK	ACTION GUIDELINES	COMMENTS (Includes schedules of use)
Combustible Gas Indicator	1 - 2 - 3 - 4 - 5 - 6	0-10% LEL No explosion hazard 10-25% LEL Potential explosion hazard; notify SHISC. >25% LEL Explosion hazard; interrupt task/evacuate  21.0% O <sub>2</sub> Oxygen normal <21.0% O <sub>2</sub> Oxygen deficient; notify SHSC <19.5% O <sub>2</sub> Interrupt task/evacuate	(X) Not Needed
Radiation Survey Meter	1 - 2 - 3 - 4 - 5 - 6	3X Background Notify SHISC >2mR/hr Interrupt task/evacuate	(X) Not Needed
Photoionization Detector Type _____ ( ) 11.7 ev ( ) 10.2 ev ( ) 9.8 ev ( ) ___ ev	1 - 2 - 3 - 4 - 5 - 6	Specify: > background upgrade to level C  > 5ppm exit site.	(X) Not Needed
Flame Ionization Detector Type _____	1 - 2 - 3 - 4 - 5 - 6	Specify:	(X) Not Needed
Detector Tubes/Monitor Type _____ Type _____	1 - 2 - 3 - 4 - 5 - 6	Specify:	(X) Not Needed
Respirable Dust Monitor Type mini-Ram _____ Type _____	①-2 3 - 4 - 5 - 6	Specify: Visible Dust or 1 mg/m <sup>3</sup>	( ) Not Needed Purpose: Airborne (potential) dust monitoring
Other Specify Visible nuisance dust and unusual vapors (odors)	①-2 3 - 4 - 5 - 6	Specify: If team notices dust or irritation to eyes or throat or encounters unusual odors, they will upgrade respiratory protection or exit site.	Contingency for Monitoring Equipment Failure

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DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES AS PAGE TWO

Personalized Decontamination

Personnel decontamination station will move from location to location based on work site.

Wash hands and face if necessary with soap and water upon doffing personal protective equipment.

Wash well before hand-to-mouth contact is made.

Workers will remove protective clothing in this order:

- equipment drop
- hard hat
- boot covers
- outer gloves
- tyvek or saranex
- respirator (If used)
- inner gloves
- face and hand wash

WASH HANDS AND FACE PRIOR TO ANY INGESTION OF FOOD OR DRINKS

( ) Not Needed

Sampling Equipment Decontamination

All sampling equipment will be thoroughly decontaminated between samples with soap, water, and then rinsing.

These tools are decontaminated between use at each sampling location by a six-step cleaning process. These steps are:

1. Immersion and vigorous scrubbing in a mild solution of laboratory grade detergent until all visual accumulations of soil are removed.
2. Thorough rinsing with potable water.
3. Methanol rinsing.
4. Spray rinsing with HPLC grade water.
5. Air Dry.

( ) Not Needed

Heavy Equipment Decontamination

All equipment and tool parts that contact excavated soil are constructed of heavy gauge steel and have no natural or synthetic components that could absorb and retain most soil-borne organic contaminants.

Heavy equipment will be decontaminated by dry methods. See Workplan Section 4.3.6.

( ) Not Needed

Containment and Disposal Method

All PPE and contaminated item must be decontaminated or collected in a plastic garbage bag and disposed of properly.

IDW will be containerized and maintained on site.

Containment and Disposal Method

IDW will be containerized and maintained on site.

Containment and Disposal Method

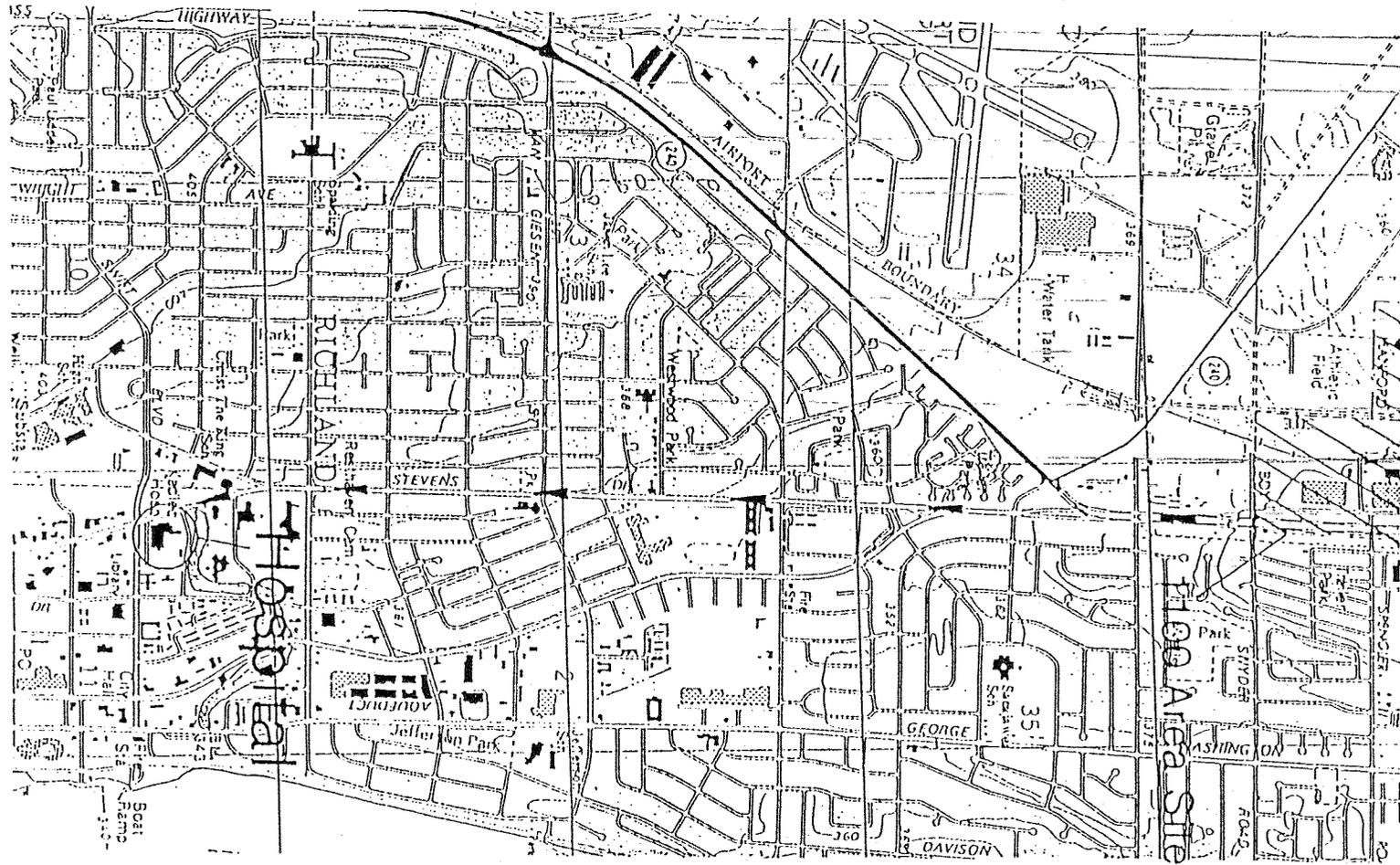
IDW will be containerized and maintained on site.

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EMERGENCY CONTACTS			EMERGENCY CONTACTS	NAME	PHONE	
Water Supply			Health and Safety Manager	Chuck Myers	1-703-968-0900	
Site Telephone	1 (509) 539-2723 1 (509) 539-3516		Project Manager	Paul Karas P.G.	1-509-943-5828	
EPA Release Report No.	1-800-424-8802		Health & Safety Coordinator	Gene Czyzewski	1-303-232-0131	
			Client Contact	Randy Chong	1-509-522-6775	
Facility Management			U.S. DOE Contact	Glenn Goldberg	1-509-376-9552	
Other (specify) Chuck Myers (home) (703) 754-0700			U.S. Environmental Protection Agency	Daniel Einan	1-509-376-3883	
			WA Dept of Ecology	Dib Goswami	1-509-736-3015	
			USACE Safety	Mike Remington	1-509-522-6782	
			State Spill Number	National Response	1-800-424-8802	
			Fire Department	Richland, WA	911	
			Police Department	Richland, WA	911	
<u>CONTINGENCY PLANS</u>  Evacuate site if any unexpected hazardous conditions are encountered. The "buddy system" will be employed for all work being done. Site staff, if evacuated, will congregate upwind of the site in a pre-designated area (to be announced at daily health and safety meeting). If a work team observe hazards for which they have not been prepared, they will withdraw from the area and call CDM Federal Health and Safety. Solo CDM representatives will not enter or remain in a work area unless accompanied by sub-contractor or facility personnel. Without regard to monitoring instrument reading. CDM Federal personnel will leave site and upgrade their level of protection if they experience nausea or dizziness.			State Police	State of Washington	1-800-283-7803/911	
			Health Department	Not Available	NA	
			Poison Control Center	State of Washington	1-800-572-5842	
			Occupational Physician	Dr. Elayne F. Theriault	1-800-229-3674	
				<u>MEDICAL EMERGENCY</u>		
				Hospital Name: Kadlec Hospital	Phone: 1-509-522-6774	
				Hospital Address: 888 Swift Blvd		
<u>HEALTH AND SAFETY PLAN APPROVALS</u>			Name of Contact at Hospital:			
Prepared by: Rob Parsons	Date: Nov 9, 1994					
HSC Signature: <i>E. Czyzewski</i>	Date: <i>11-17-94</i>					
HSM Signature:	Date:					
			Name of 24-Hour Ambulance: Richland, WA			
			Phone: 911			
			Route to Hospital (Attach map with route to hospital) From 1100 Area take Stevens Drive South 2.25 miles from the Hanford Site boundary to Swift Blvd. The hospital is located on the corner of Swift Blvd and Stevens Drive.			
			Distance to Hospital: 2.75 mi total			





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