

***Appendix P***

***Example Audit Checklist***

The following audit questionnaire was used in the EPA Direct Delayed Response Program to consistently and objectively evaluate contract laboratories analyzing soil samples. The following example checklist is for pH and is not the complete questionnaire.

ANALYTICAL LABORATORY ON-SITE EVALUATION QUESTIONNAIRE  
DDRP SOIL SURVEY

GENERAL

Date: \_\_\_\_\_

Laboratory: \_\_\_\_\_

Street Address: \_\_\_\_\_

Mailing Address  
(if different from above): \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

Laboratory Telephone  
Number: (      ) \_\_\_\_\_

Laboratory Director \_\_\_\_\_

Laboratory Quality  
Assurance Officer (Quality  
Control Chemist): \_\_\_\_\_

Type of Evaluation: \_\_\_\_\_

Contract Number: \_\_\_\_\_

Contract Title: \_\_\_\_\_

GENERAL (continued)

Personnel Contacted:

<u>Name</u>	<u>Title</u>

<u>Name</u>	<u>Title</u>

## ORGANIZATION AND PERSONNEL

Laboratory Organization Chart:

## ORGANIZATION AND PERSONNEL

### Laboratory Personnel:

Position	Name	Academic Training*	Special Training	Years Experience**
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\* List highest degree obtained and specialty. Also list years toward a degree.

\*\* List only experience directly relevant to task to be performed.

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Do personnel assigned to this project have the appropriate educational background to successfully accomplish the objectives of the program?			
Do personnel assigned to this project have the appropriate level and type of experience to program?			
Is the organization adequately staffed to meet project commitments in a timely manner?			
Does the laboratory Quality Assurance Supervisor report to senior management levels?			
Was the Project Manager available during the evaluation?			
Were chemists and technicians available during the evaluation?			
Was the Quality Assurance Supervisor available during the evaluation?			

Laboratory Manager:

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does the laboratory manager have his/her own copy of the standard operating procedures?			
Does the laboratory manager have his/her own copy of the instrument performance data?			
Does the laboratory manager have his/her own copy of the latest monthly QC plots?			
Is the laboratory manager aware of the most recent control limits?			
a. The data itself?			
b. The quality control data sheet with analyst notes?			
c. The general instrument performance and routine maintenance reports?			

## STANDARD OPERATING PROCEDURES (SOP)

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does the laboratory have a standard operating procedure (SOP) manual?			
Is the SOP manual followed in detail?			
Does the SOP manual contain quality control practices?			
Does each analyst/technician have a copy of the SOP manual?			
Does the SOP manual deviate from the procedures required by the project?			
If the SOP manual does deviate, are the deviations documented in written form?			
Does each analyst/technician have a copy of all methods and procedures required by this project?			
Are plots of instrumental accuracy and precision available for every analysis?			
Are detection limit data tabulated for each analysis?			

## LABORATORY FACILITIES

When touring the facilities, give special attention to:

- (1) the overall appearance of organization and neatness,
- (2) the proper maintenance of facilities and instrumentation,
- (3) the general adequacy of the facilities to accomplish the required work.

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does the laboratory appear to have adequate workspace (6 linear meters of unencumbered bench space per analyst)?			
Does the laboratory have a source of distilled/demineralized water?			
Is the specific conductance of distilled/demineralized water routinely checked and recorded?			
Are the analytical balances located away from draft and areas subject to rapid temperature changes?			
Has the balance been calibrated within one year by a certified technician?			
Is the balance checked with a class S standard before each use and recorded in a logbook? Have technician demonstrate how this is done.			
Are exhaust hoods provided to allow efficient work with volatile materials?			
Have the hoods been checked for operating efficiency? How often is this done?			
Is the laboratory maintained in a clean and organized manner?			
Are contamination-free work areas provided for the handling of toxic materials?			
Are adequate facilities provided for separate storage of samples, extracts, and standards, including cold storage?			
Is the temperature of the cold storage units recorded daily in logbooks?			
Are chemical waste disposal policies/procedures adequate?			
Are contamination-free areas provided for trace level analytical work?			
Can the laboratory supervisor document that trace-free water is available for preparation of standards and blanks?			

### LABORATORY FACILITIES

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Do adequate procedures exist for disposal of waste liquids from the ICP and AA spectrometers?			
Do adequate procedures exist for disposing of liquid and solid wastes?			
Is the laboratory secure?			
Are all chemicals dated on receipt and thrown away when shelf life is exceeded?			
Are all samples stored in the refrigerator between analyses?			
Are acids and bases stored in separate areas?			
Are hazardous, combustible, and toxic materials stored safely?			

### LABORATORY FACILITIES

<u>Item</u>	<u>Available</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	(where applicable, cite system, QC check, adequacy of space)
Gas			
Lighting			
Compressed air			
Vacuum system			
Electrical services			
Hot and cold water			
Distilled water			
Laboratory sink			
Ventilation system			
Hood space			
Cabinet space			
Storage space (m <sup>2</sup> )			
Refrigerated storage (4°C)			



## EQUIPMENT GENERAL

<u>Item</u>	<u>Equipment</u>			<u>Condition/Age</u>			<u>Comments</u>
	<u># of Units</u>	<u>Make</u>	<u>Model</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>	
Balance, analytical							
(1)							
(2)							
(3)							
Balance, top loader							
Class "S" weights							
Balance table							
NBS-calibrated thermometer							
Desiccator							
Distilled water							
Double deionized, distilled/deionized, or double distilled water							
Glassware							
(1) Beakers							
(2) Erlenmeyer flasks							
(3) Sedimentation cylinders							
(4) Graduated cylinders							
(5) Fleakers							
(6) Other							
Drying ovens							
Hot plates							
Water bath							
Centrifuge							
Vortex mixer							

EQUIPMENT GENERAL

<u>Item</u>	<u>Equipment</u>			<u>Condition/Age</u>			<u>Comments</u>
	# of Units	Make	Model	Good	Fair	Poor	
Eppendorf pipets (or equivalent)							
Reciprocating shaker							

Comments:

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pH DETERMINATION

<u>Item</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Installation Date</u>	<u>Comments</u>
Digital pH meter				
Combination electrodes, non-gel type				

<u>Item</u>	<u>Available</u>	<u>Quantity</u>	<u>Type</u>	<u>Comments</u>
Thermometer				
Beakers, 50 mL				
Stirrers				
QCCS standard				

<u>Chemical</u>	<u>Quantity</u>	<u>Grade</u>	<u>Expiration Date</u>	<u>Comments</u>
Calcium Chloride (CaCl <sub>2</sub> )				
Calcium hydroxide (Ca(OH) <sub>2</sub> )				
Chloroform (CHCl <sub>3</sub> ) or Thymol (C <sub>10</sub> H <sub>14</sub> O)				
Hydrochloric acid (HCL)				
National Bureau of Standards (NBS) buffers				
Potassium Biphthalate (KHC <sub>8</sub> H <sub>4</sub> O <sub>4</sub> )				
Potassium chloride (KCl)				

## pH DETERMINATION

<u>Question</u>	<u>Yes</u>	<u>No</u>	<u>NA</u>	<u>Comments</u>
Are chemicals reagent grade or better?				
Is the air-dried soil stored in sealed containers?				
Does the pH meter have internal temperature compensation to +0.5°				
Is the combination electrode a non-gel type?				
Is the combination electrode of the recommended style with retractable				
Are the buffers calibrated daily to +.01 pH units?				
Is the pH meter: - calibrated before samples are				
Is the temperature compensation manual or internal?				
Are equilibrium times required for standards checked, to see if electrode				
Is a spare combination electrode available and properly stored?				
Is manufacturer recommended warm-up time allowed before				
Are pH meters placed away from drafts and areas of rapid				
Are the specified between-sample procedures followed?				
Are pH units equipped with programmable sampling times?				
If yes above, are they used in this analysis?				
Are electrodes properly stored and maintained?				

## pH DETERMINATION

<u>Question</u>	<u>Yes</u>	<u>No</u>	<u>NA</u>	<u>Comments</u>
Are the QC results plotted in real time?				
What is the QCCS sample?				
Is the QCCS solution analyzed first and thereafter as called for in the				
Are a QCCS and duplicate sample included in each run?				
Is the quality control data reviewed by the analyst before deciding				

DOCUMENTATION/TRACKING

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
<p>Is a sample custodian designated? If yes, name of sample custodian:</p> <p>-----</p>			
<p>Are the sample custodian's procedures and responsibilities documented? If yes, where re these documented?</p>			
<p>Is sample tracking performed via paper or computer?</p>			
<p>Are written standard operating procedures (SOPs) developed for receipt of samples? If yes, where are they documented?</p>			
<p>Are written standard Operating procedures (SOPs) developed for compiling and maintaining sample document files? If yes, where are they documented?</p>			
<p>Are samples stored under refrigeration? At what temperature?</p>			
<p>After completion of the analysis, are the samples properly stored for six months or until laboratory personnel are told otherwise?</p>			

## ANALYTICAL METHODOLOGY

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Are the required methods used?			
Is there any unauthorized deviation from contract methodology?			
Are written analytical procedures provided to the analyst?			
Are the reagent grade or higher purity chemicals used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA?			
Are reference materials properly labeled with concentrations, date of preparations, and the identity of the person preparing the sample?			
Is a standard preparation and tracking logbook maintained?			
Do the analysts record bench data in a neat and accurate manner? Is the appropriate instrumentation used in accordance with the required protocol(s)?			



## QUALITY CONTROL

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does the laboratory maintain a quality control manual?			
Does the manual address the important elements of a QC program, including			
a. Personnel:			
b. Facilities and equipment:			
c. Operation of instruments?			
d. Documentation of procedures?			
e. Procurement and inventory			
f. Preventive maintenance?			
g. Reliability of data?			
h. Data validation?			
i. Feedback and corrective action?			
j. Instrument calibration?			
k. Record keeping?			
l. Internal audits?			
Are QC responsibilities and reporting relationships clearly defined?			
Have standard curves been adequately documented?			
Are laboratory standards traceable?			
Are quality control charts maintained for each routine analysis?			
Do QC records show corrective action when analytical results fail to meet QC			
Do supervisory personnel review the data and QC results?			

## QUALITY CONTROL

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does the QC chemist have a copy of the standard operating procedures?			
Does the QC chemist have a copy of the instrument performance data?			
Does the QC chemist have a copy of the latest QC plots?			
Is the QC chemist aware of the most recent control limits?			
Does the QC chemist prepare a blind audit sample once per week?			
Does the QC chemist routinely review and report blank audit data to the laboratory manager?			
Does the QC chemist update control limits and obtain new control charts once per batch?			
Are all QC data (e.g., control charts, regression charts, QC data bases) up to date and accessible?			
Are minimum detection limits calculated as specified?			
Is QC data sheet information reported to the analyst?			

DATA HANDLING

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Does data clerk check all input to the computer for accuracy?			
Are calculations checked by another person?			
Are calculations documented?			
Does strip chart reduction by on-line electronic digitization received at least 5% manual spot checking?			
Are data from manually interpreted strip charts spot-checked after initial entry?			
Do laboratory records include the following:			
- Sample identification number			
- Sample type			
- Date sample received in laboratory			
- Date of analysis			
- Analyst			
- Result of analysis (including raw analytical data)			
- Recipient of the analytical data			
Does laboratory follow required sample tracking procedures from sample receipt to discard?			
Does the data clerk routinely report quality control data sheet information to the analyst?			
Does the data clerk submit quality control data sheet information to the laboratory manager, along with the analytical data to be reported?			
Do records indicate corrective action taken?			

## DATA HANDLING

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Are provisions made for data storage for all raw data, calculations, quality control data, and reports?			
Are all data and records retained the required amount of time?			
Are computer printouts and reports routinely spot-checked against laboratory records before data are released?			

## SUMMARY

<u>Item</u>	<u>Yes</u>	<u>No</u>	<u>Comment</u>
Do responses to the evaluation indicate that project and supervisory personnel are aware of QA and its application to the project?			
Do project and supervisory personnel place positive emphasis on QA/QC?			
Have responses with respect to QA/QC aspects of the project been open and direct?			
Has a cooperative attitude been displayed by all project and supervisory personnel?			
Does the organization place the proper emphasis on quality assurance?			
Have any QA/QC deficiencies been discussed before leaving?			
Is the overall quality assurance adequate to accomplish the objectives of the project?			
Have corrective actions recommended during previous evaluations been implemented?			
Are any corrective actions required? If so, list the necessary actions below.			

