

Preparing Activity: USACE

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Superseding  
UFGS-02 54 23 (February 2010)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2025

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02/25

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### SECTION 02 54 23

#### SOIL WASHING THROUGH SEPARATION/SOLUBILIZATION 02/25

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NOTE: This guide specification covers the requirements for removal of contaminants by soil washing.

Adhere to [UFC 1-300-02](#) Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a [Criteria Change Request \(CCR\)](#).

\*\*\*\*\*

## PART 1 GENERAL

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NOTE: This UFGS provides the framework for developing a project-specific soil washing specification. It should be modified as necessary for a given site, to incorporate the conditions, soil washing technology, and regulatory requirements which are specific to the site.

Soil washing can be applied to the removal of most contaminants, including heavy metals and other inorganics, organics (including per- and polyfluoroalkyl substances [PFAS]), and radioactive wastes. Water-based applications involve separation of fine from coarse-grained soil particles to reduce

the volume requiring on- or off-site disposal (i.e., adsorption to the soil matrix, which consists of organic carbon content and soil particles themselves). Larger soil fractions may need to undergo attrition scrubbing or other methods to remove attached contaminated finer soil fractions. Solvent-based applications involve the dissolution of contaminants into the aqueous phase for removal and subsequent treatment or disposal of the extraction solvent/reagent waste stream. Refer to paragraph BENCH-SCALE TREATABILITY STUDY WORK PLAN for more details regarding the applicability and physical limitations of soil washing.

A systematic project planning approach should be employed when developing sampling procedures to demonstrate the performance of the soil washing treatment process, ideally through implementation of the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) or some such similar process.

The soil washing operation considered in this section starts with the raw contaminated soil piles; continues through preparation, feeding, washing, separation, stockpiling, waste (solid, liquid and/or gaseous) treatment and disposal; and ends at the treated clean soil piles. As applicable, refer to Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for requirements related to excavation, stockpiling, and handling of the contaminated soils; Section 31 00 00 EARTHWORK for placement of treated soils in on-site permanent storage; and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS for requirements relevant to offsite transportation and disposal

\*\*\*\*\*

## 1.1 MEASUREMENT AND PAYMENT

### 1.1.1 Unit Prices

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NOTE: Edit this paragraph based on whether the Contract will use a single job price or unit prices. If Section 01 20 00 PRICE AND PAYMENT PROCEDURES is in the project, move these paragraphs to that Section for editing.

If the project includes Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS, coordinate measurement and payment methods and contaminated material handling and stockpiling between this Section and Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

This paragraph should be modified based on the project specific conditions. Special Clauses should address modification of the full scale remediation

unit price due, if warranted, based on the results of bench-scale treatability studies or the field demonstration testing. For remediation using soil washing, a Request for Proposal rather than Invitation for Bid procurement process is generally used to select a Contractor.

\*\*\*\*\*

#### 1.1.1.1 Contaminated Materials

Payment for soil washing treatment of the feed soils will be based on the contract unit price schedule for each [metric ton ton][\_\_\_\_\_] on a dry weight basis of the previously untreated feed soils entering the treatment plant following removal of feed oversize soil. This unit price will include costs for materials, labor, processing and treatment, testing and analyzing, operation and maintenance.

Weigh the feed oversize and the feed soils separately during operation of the soil washing treatment plant (the treatment plant). The feed oversize (or debris) consists of the oversized soils separated from the raw contaminated soils by the soil preparation and feed system. The feed soils are the balance of the raw contaminated soils after the feed oversize has been removed. Convert the measured gross (bulk) weight of the feed soils to be treated by soil washing to dry weight based on the [percent moisture content][\_\_\_\_\_] of representative feed soil samples. Determine the percent moisture content in accordance with [ASTM D2216][ASTM D4643][ASTM D4959][\_\_\_\_\_] daily. Determine moisture content for every [500][\_\_\_\_\_] metric tons tons of feed soil.

#### 1.1.2 Single Job Prices

##### [1.1.2.1 Bench-Scale Treatability Studies

\*\*\*\*\*

**NOTE: Delete this paragraph if bench-scale treatability studies have already been performed.**

\*\*\*\*\*

Payment for bench-scale treatability studies will be included as part of base bid items based on a single job price for each bench-scale treatability study test run requested by the Contracting Officer and properly completed. Include costs for labor and soils materials for: preparing plans; collecting representative contaminated soils; conducting the studies (including sampling and analysis); evaluating results; preparing the treatability study report; and treating and disposing of study-derived wastes.

##### [1.1.2.2 Field Demonstration

Payment for field demonstration test runs will be included as part of base bid items based on a single job price for each test run requested by the Contracting Officer and properly completed. Include costs for labor and materials for: processing and treatment, testing and analyzing, report preparation, and other incidental work (such as, manufacturers' field services, health and safety monitoring and controls, and utilities).

##### 1.1.2.3 Feed Oversize Materials Treatment [and][or] Disposal

Payment for treatment [and][or] disposal of feed oversize soils, washwater

process sludge, spent washwater, and process treatment soils exceeding post-treatment criteria is provided in [Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS][\_\_\_\_\_].

#### 1.1.2.4 Other Work Items

\*\*\*\*\*  
NOTE: Coordinate this paragraph with Section  
01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND  
CONTROLS. Temporary utility connections are covered  
in Section 01 50 00 TEMPORARY CONSTRUCTION  
FACILITIES AND CONTROLS.  
\*\*\*\*\*

Payment for other work items not included in the above paragraphs will be included in the payment for the base bid for remediation of the contaminated soils. The other work items include submittals related to operation of the treatment plant, mobilization and demobilization, configuration and installation of the treatment plant, manufacturers' field services, environmental compliance monitoring, health and safety monitoring and controls, and utilities required for the soil washing treatment if approved by the Government as necessary for the project.

#### 1.2 REFERENCES

\*\*\*\*\*  
NOTE: This paragraph is used to list the  
publications cited in the text of the guide  
specification. The publications are referred to in  
the text by basic designation only and listed in  
this paragraph by organization, designation, date,  
and title.

Use the Reference Wizard's Check Reference feature  
when you add a Reference Identifier (RID) outside of  
the Section's Reference Article to automatically  
place the reference in the Reference Article. Also  
use the Reference Wizard's Check Reference feature  
to update the issue dates.

References not used in the text will automatically  
be deleted from this section of the project  
specification when you choose to reconcile  
references in the publish print process.

\*\*\*\*\*

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D2216 (2019) Standard Test Methods for  
Laboratory Determination of Water  
(Moisture) Content of Soil and Rock by Mass

ASTM D4643 (2017) Standard Test Method for  
Determination of Water Content of Soil and  
Rock by Microwave Oven Heating

ASTM D4959 (2016) Determination of Water (Moisture)  
Content of Soil by Direct Heating

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44 (2018) Specifications, Tolerances, and  
Other Technical Requirements for Weighing  
and Measuring Devices

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 505-B-04-900A (2005) Intergovernmental Data Quality Task  
Force - Uniform Federal Policy for Quality  
Assurance Project Plans: Evaluating,  
Assessing, and Documenting Environmental  
Data Collection and Use Programs Part 1:  
UFP-QAPP Manual

EPA 540/2-91/020A (1991) Guide for Conducting Treatability  
Studies under CERCLA: Soil Washing:  
Interim Guidance

EPA SW-846 (Third Edition; Update VII) Test Methods  
for Evaluating Solid Waste:  
Physical/Chemical Methods

UFP-QAPP WKSTS (2012) Intergovernmental Data Quality Task  
Force - Uniform Federal Policy for Quality  
Assurance Project Plans, Optimized  
UFP-QAPP Worksheets

### [1.3 PRE-INSTALLATION MEETINGS

\*\*\*\*\*  
**NOTE: Delete this paragraph if the requirements are  
included in Section 01 30 00 ADMINISTRATIVE  
REQUIREMENTS, Section 01 32 01.00 10 PROJECT  
SCHEDULE, or other Specification Section.**

**Appropriate facility personnel should be present at  
the pre-installation meeting if siting of the  
treatment facility and other associated work areas  
will be discussed.**

\*\*\*\*\*

Conduct a pre-installation meeting at the jobsite at least [five business  
days prior to the start of operations on the project][\_\_\_\_\_]. Arrange the  
pre-installation meeting and follow the written [pre-installation meeting  
agenda](#) submitted prior to the meeting. The purpose of this meeting is to  
review the requirements of this specification and the associated plans.  
The following individuals must be in attendance at this meeting:  
Contractor's Project Manager and Site Foreman and [Contracting  
Officer][\_\_\_\_\_].

Record [pre-installation meeting minutes](#) and publish by way of email within  
48 hours to all attendees. Re-publish the meeting minutes within 48 hours  
pending any subsequent comments from the attendees.



#### 1.4 SYSTEM DESCRIPTION

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NOTE: If pretreatment such as blending for a homogenous feed or separating contaminated soils with different characteristics for different treatment operating conditions is required, some of the pretreatment requirements should be specified in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS so the pretreatment required can be properly specified in this specification without any duplication. In addition, representative samples of the contaminated soils excavated and stockpiled should be collected and analyzed regularly to check and document its physical and chemical characteristics for design consistency and suitability as a feed of the contaminated soils.

Indicate if the Government knows/assumes that there are multiple dissimilar types of contaminated materials that will require different soil washing treatment processes. This may be based on site investigations and/or previously completed treatability studies.

\*\*\*\*\*

The work consists of soil washing treatment of approximately [\_\_\_\_\_] metric tons [\_\_\_\_\_] tons of contaminated material.

##### 1.4.1 Design Requirements

###### 1.4.1.1 Soil Washing Treatment Process

\*\*\*\*\*

NOTE: Modify this paragraph if the Designer will require the use of specific washwater mixtures (e.g. methanol solvent for PFAS-contaminated materials) based on previously conducted treatability studies, etc.

\*\*\*\*\*

Provide washwater consisting of[ water only][ water plus approved extraction [solvents][reagents] such as acids, bases, surface active agents (surfactants), solvents, and chelating or sequestering agents] to enhance the solubilization [and][or] separation of the contaminants from the coarser [and][or] finer grained soils as needed to increase the efficiency of the soil washing treatment. Identify specific extraction [solvents][reagents] during the bench-scale treatability [study][design] steps.

###### 1.4.1.2 Soil Washing Treatment Plant

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NOTE: Omit the third- and fourth-to-last sentences of this paragraph ("The Contractor may propose ... must be addressed in detail...") if a specific method of treatment is desired.

\*\*\*\*\*

Configure the treatment plant based on the contaminated soils characteristics data and the Contractor's own interpretation of the bench-scale or pilot-scale treatability study results performed by the Contractor. Provide a full-scale treatment plant that is transportable. The capacity of the soil washing system must be [\_\_\_\_][consistent with the remedial action schedule]. The materials, components, accessories, and equipment used to fabricate the treatment plant must meet their functional requirements, and must be compatible with the contaminants of concern, the extraction [solvents][reagents] used in the treatment processes, and the operating conditions of each unit operation.[ The Contractor may propose a treatment plant different from the treatment plant specified, in which case the proposed treatment plant capable of providing equivalent performance must be addressed in detail [in the Contractor's proposal][ and ][in the Soil Washing Work Plan][\_\_\_\_].] Provide a safe and reliable soil washing treatment plant in compliance with the applicable codes, regulations, and specified requirements. The treatment plant must consist of the following major systems:

#### 1.4.1.2.1 Soil Preparation and Feed System

Soil preparation and feed system must include, but not be limited to, feed oversize separation, blending [and][or] separation of different soil particle sizes [and][or] contaminant levels (if needed) to provide a consistent feed, stockpiling of feed oversize and feed soils, conveying, feeding, treatment [and][or] disposal of feed oversize, dust/emission controls, and measurement of feed oversize and feed soils. Base the capacity of this system on the downstream treatment system operations. Refer to Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for requirements related to excavation, handling, and stockpiling of the contaminated soils. Since heterogeneity and inconsistent feed conditions can impact soil washing removal efficiency, if appropriate, pre-processing steps to maintain homogenization for optimal removal efficiency should be specified in the Soil Washing Work Plan. Soils may need to be segregated by order of magnitude contaminant concentrations and either blended for more homogeneity or treated using different process conditions to optimize treatment throughput and minimize treatment costs, which should be determined during the [treatability][design] steps.

#### 1.4.1.2.2 Soil Washing and Separation System

Provide a soil washing and separation system which includes mixing, washing [(including the preparation and addition of any extraction [solvents][reagents])], [solids and liquid separation][soil particle size separation][\_\_\_\_], dewatering of treated soil, and measurement of process parameters and treated soils. For example, coarse grained soils can be separated using vibratory screens or trommels. Additional separation of the finer grained soils can be performed using hydrocyclones or spiral classifiers that leverage differences in settling velocities of the particles. Treated soils are the feed soils having been washed and separated by the soil washing and separation system. Treated clean soils are the treated soils which meet the post-treatment criteria. Provide a soil washing system that is equipped with direct means for controlling the washwater settings including[ pH][ temperature][ pressure][ composition][ quantity][ contact time][ and ][particle size separation][\_\_\_\_]. The mixing and washing equipment must have the capability to dissociate the contaminated fine soil particulate [types][sizes] from the coarse soil particulate [types][sizes] [and][or] to solubilize the contaminants into the washwater mixture so that the post-treatment criteria can be achieved

at a minimum for the coarser grained soils.[ Magnetic separation of ferrous soil must be done using electromagnets.] Provide dewatering equipment that is capable of lowering the moisture content of treated soils and corresponding washwater treatment sludges to less than [10][15][\_\_\_\_\_] percent as required for on-site backfilling [and][or] offsite disposal.

#### 1.4.1.2.3 Spent Washwater Treatment System

Spent washwater is washwater that has been in contact with contaminated feed soils or other contaminated surfaces, consisting of a mixture of contaminated fine particles [and][or] dissolved contaminants, washwater, and run off water from soil storage and treatment areas. If required, provide a spent washwater treatment system to include physical, chemical, [and][or] biological treatment of spent washwater; dissolved [and][or] suspended solids removal; process sludge dewatering; recycle, reuse, [and][or] discharge of treated washwater; and measurement of treatment parameters and dewatered [and][or] treated process sludge. Process sludge is the sludge resulting from the removal of dissolved contaminants [and][or] the contaminated suspended [soils][solids] in the spent washwater. If a washwater treatment system is required, it must have the capacity and capability to treat the generated volume from the design capacity of the treatment plan (also including collected stormwater run-off and any leachate collected from the soil piles) for recycle, reuse, or treatment and discharge. The treated washwater must meet the quality limits for [recycle][reuse][discharge], [and][or] [disposal][\_\_\_\_\_]. The process sludge must be treated [and][or] disposed of according to its characteristics and regulatory requirements.

#### 1.4.1.2.4 Plant Supporting System

Include a supporting system in the treatment plant for water storage and distribution, extraction [solvents][reagents] storage and distribution, [power and steam][power] generation and distribution, and fire safety. Provide these supporting facilities with adequate capacities to deliver water, extraction [solvents][reagents], power, [steam][\_\_\_\_\_], and fire protection necessary for operation of the soil preparation and feed system, soil washing and separation system, and[ spent washwater treatment system][\_\_\_\_\_]. Provide [alternate][auxiliary] power source if sufficiently reliable source is not available. Provide emergency power for lighting, controls, and computer system operation[, \_\_\_\_\_]. Provide material feeding equipment for each extraction [solvent][reagent] consisting of a feed tank and mixer for preparing feed stock, and a metering pump for controlled feeding. Refer to [Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS][\_\_\_\_\_] for requirements related to spill containment structures, stormwater pollution prevention, and air quality.

#### 1.4.1.2.5 Sampling, Monitoring, and Control Requirements

\*\*\*\*\*  
**NOTE: The process and waste generation data storage requirements should be specified based on the quantity, frequency, and requirement of data reduction and analysis for a specific project.**  
\*\*\*\*\*

Provide appropriate sampling and monitoring equipment for controlling the performance of the treatment processes and for complying with design and regulatory requirements. Provide monitoring and control equipment for the

treatment processes with the necessary accuracy and sensitivity to measure and control the operating ranges for system parameters such as[ material feed rate][ washwater flow rate][ pH][ contact time][ cut size][\_\_\_\_\_] so that the treatment plant can perform to its designed capacity, efficiency, and reliability. The unit operations of the treatment plant must be complete with required instruments, controls, and local control panels. Provide a main control center to facilitate the overall control of the treatment plant. The main control center must have the necessary provisions for heating, ventilation, and air conditioning for proper operation of the instruments, controls, and electronic data storage system. Refer to Section 23 30 00 HVAC AIR DISTRIBUTION for proper heating, ventilation, air conditioning. The signal transmission to and from the main control center must be [4-20 mA][\_\_\_\_\_].

#### 1.4.1.3 Utilities

\*\*\*\*\*  
**NOTE: The locations and details (such as utility point of contact, sizes, capacities, and flows) of the utility hookups should be provided on the drawings for the Contractor's use. Verify the utilities are available on-site before including the second sentence.**  
\*\*\*\*\*

In accordance with Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS, provide the utilities associated with the installation and operation of the treatment plant including, but not limited to: [ telecommunications][ electricity][ water][ steam][ gas][ sanitary][ and ][ solid waste facilities][\_\_\_\_\_]. The[ telecommunications][ electricity][ steam][ water][ gas][ sanitary][ and ][ solid waste facilities][\_\_\_\_\_] are available at the site.[ Refer to the drawings for hookup locations and other details.]

#### 1.4.1.4 Material Measurement

\*\*\*\*\*  
**NOTE: This paragraph is primarily intended to ensure that calibrated scales are being used to weigh treated soil, when weight is being used as the basis for measurement and payment.**  
\*\*\*\*\*

Provide scales, meters, and volumetric measuring devices for measuring oversize materials, feed contaminated materials, reagents, and water which conform to the applicable requirements of NIST HB 44, except that the accuracy must be plus or minus[ 0.1][\_\_\_\_\_] percent of the quantity being measured. For scales used to measure weight of material in vehicles, provide scales of sufficient length to permit simultaneous weighing of all axle loads. For scales used to make measurement for payment, ensure the scale is certified[ by an acceptable scales company representative][ by an inspector of the State Inspection Bureau charged with scales inspection] prior to weighing any materials. Perform a check of calibration of measuring equipment prior to initial use, and once every [seven][\_\_\_\_\_] calendar days. The requirements of this paragraph do not apply to measurement of chemical data.

#### [1.4.1.5 Bench-Scale Treatability Study Work Plan

\*\*\*\*\*

NOTE: Typically, a bench-scale treatability study will have been performed prior to development of this specification; however, the Contractor is sometimes required to complete a bench-scale treatability study prior to performing full-scale work at the site. Bench-scale treatability study test protocol and results should include any proposed extraction solvents/reagents (including water) and the respective mix ratios to be used during full-scale treatment. This paragraph should indicate if the Designer will require bench-scale treatability testing of any specific extraction solvents/reagents (e.g. methanol for PFAS-contaminated materials). The test results submitted should verify that the mix design proposed meets the post-treatment criteria listed in paragraph PERFORMANCE REQUIREMENTS.

Since soil particle size separation represents the primary method of contaminant removal/soil volume disposal reduction, the bench-scale treatability study work plan must include a detailed soil grain size analysis and laboratory testing for contaminant distribution within pre-determined ranges of separated soil types/grain sizes. Outcomes from the bench-scale treatability study should first establish and determine a go/no- go decision point for the viability and cost effectiveness for moving forward with soil washing for the identified soil particle size mix and contaminant distribution and the viability of meeting post-treatment criteria. In general based on soil washing's history, it is less cost effective as the percentage of finer grained soils increases. For example, a literature rule-of-thumb particle size distribution of 0.25 to 2 millimeters 0.001 to 0.08 inches is considered optimal for soil washing, while <0.063 millimeters 0.002 inches may not be viable - which correlates to <25% silts and clays considered optimal and >50% may not be viable. High clay content with corresponding high moisture levels poses a soil handling and feed challenge.

\*\*\*\*\*

Submit a Bench-Scale Treatability Study Work Plan consistent to the extent practical with EPA 540/2-91/020A within [30][\_\_\_\_\_] calendar days after notice to proceed. Do not perform the bench-scale treatability study until the work plan is approved. Prepare [draft for Government review] [draft-final for [regulatory][\_\_\_\_\_] review] and final versions of the Bench-Scale Treatability Study Work Plan. Allow [30][\_\_\_\_\_] calendar days for [Government] review [and [30][\_\_\_\_\_] calendar days for regulatory review]. Allow [45][\_\_\_\_\_] days for comment resolution following each review and preparing the next version of the document. The technical requirements to address include, but are not limited to, the following: procedures for obtaining contaminated soils to be used in the bench-scale treatability study; contaminant distribution as a function of distribution

within defined soils lithology types/grain sizes); washwater requirements determination and optimization; residuals management; mass balance calculation; unit processes/operations evaluation; definition of particle size separation requirements based on fine versus coarse grain sizes or specific particle size distribution that meets the post-treatment criteria to allow for on-site re-deposition and minimizes the off-site disposal volume; soil [testing][sampling] protocols and analytes. If appropriate, the work plan should also include the testing of appropriate extraction [solvents][reagents] besides water for more difficult to extract contaminants or for higher percentages of finer grained soils to optimize removal efficiencies. In addition, the work plan must include a thorough discussion of how the study's operating conditions will compare with full-scale conditions, and how the variances will be addressed in scale-up. If proprietary extraction [solvents][reagents] are to be used in the processes, Safety Data Sheets and other non-proprietary type information must be provided to assess their potential for secondary contamination or other exposures during the installation and operation of the treatment plant.

#### 11.4.1.6 Soil Washing Work Plan

\*\*\*\*\*  
**NOTE: The Designer may wish to require the Soil Washing Work Plan, UFP-QAPP, and other preconstruction submittals required under this section to be completed concurrently, or with the other plans being appendices of one primary plan. This Section should be edited to reflect such a requirement if applicable.**  
\*\*\*\*\*

Submit a [Soil Washing Work Plan](#) within [60][\_\_\_\_\_] calendar days after completion of the Bench-Scale Treatability Study [no less than [120][\_\_\_\_\_] calendar days prior to the anticipated start of full-scale soil washing operations]. Do not perform soil washing until the Work Plan is approved. Prepare [draft for Government review][draft-final for [regulatory][\_\_\_\_\_] review] and final versions of the Soil Washing Work Plan. Allow [30][\_\_\_\_\_] calendar days for [Government] review [and [30][\_\_\_\_\_] calendar days for regulatory review]. Allow [45][\_\_\_\_\_] days for comment resolution following each review and preparing the next version of the document. The Work Plan must address the technical requirements listed in this Section and must include, but is not limited to, the following:

- a. **Schedule.** Specify dates for the start and completion of [treatability studies][\_\_\_\_\_] , design documentation, mobilization, installation, field demonstrations, treatment of contaminated soils, disposal of wastes, and demobilization. Include details such as intended hours of operation, scheduled downtime, and routine maintenance downtime.
- b. **Project Organization.** Propose a project organization for carrying out the remediation of contaminated soils by soil washing treatment. Provide an organization chart including subcontractors. Clearly define the responsibilities of each individual in the organization in terms of project activities including, but not limited to: project management and coordination; scheduling and schedule control; quality control; sampling, measurement, analysis, and data management; and operation and maintenance of the treatment plant.

- c. Principles of Operation. Provide a detailed description of the proposed treatment plant. Include treatment systems and corresponding unit operations, treatment capacity, preparation of feed soils, soil handling and feed systems, treatment requirements for washwater, properties and handling of extraction [solvents][reagents] (including reuse, reclamation, or disposal of spent or recovered materials), mechanism of contaminant removal, characteristics and stockpiling of the treated soils, and wastes generation and disposal. Post treatment soil criteria for on-site re-deposition,[ disposal criteria][ washwater treatment discharge criteria][ and ][ air emissions criteria][\_\_\_\_\_] must be presented based on regulator [feedback][permit] requirements and other site requirements.
- d. Equipment. Describe treatment system equipment completely, including, but not be limited to, equipment identification, manufacture make and model, physical size, operating conditions, and materials of construction.
- e. Drawings. Provide drawings showing at least: layout of the treatment plant, including feed soil stockpiles; storm water drainage and soil pile leachate collection plan for the soil stockpile storage areas; pre-treatment and post-treatment soil stockpile construction; washwater treatment system and discharge design/construction; and piping, instrumentation, and electrical process flow diagrams and details.
- f. Quality Control. Provide a quality control plan as required in Section 01 45 00 QUALITY CONTROL, to detail the procedures for inspection, testing, and correction of deficiencies. This program must ensure that the Contractor's operations comply with the requirements of the contract plans and specifications with respect to quality of materials, workmanship, construction, finish, functional performance, and accuracy of data.
- g. Process Soils Tracking Schedule. Provide a Process Soils Tracking Schedule for recording and managing the quantities of the contaminated soils processed,[ feed oversize treated [and][or] requiring disposal],[ process sludge treated [and][or] requiring disposal],[ other waste streams requiring disposal such as [\_\_\_\_\_]],[ reprocessing of treated soils that fail to meet post treatment criteria][\_\_\_\_\_] , and the treated clean soils to be re-deposited on-site (e.g., use as backfill) or soils exceeding post-treatment criteria requiring off-site disposal. Track each soil from the original source, continue through various stages of handling and treatment, and end at the ultimate disposal.
- h. Mobilization and Demobilization. Include a mobilization and demobilization plan containing, but not be limited to: transport of personnel, material, and equipment; decontamination and disposal of materials and equipment brought to the site; decontamination and disposal of the treatment area and other paved surfaces; and decontamination of equipment during demobilization. Include a Post-Treatment Cleanup and Sampling Plan in the mobilization and demobilization plan for areas where there was contact with contaminated materials and were disturbed by the remedial action/site work. Also, discuss the restoration of disturbed areas such as grading, seeding, etc. Address the requirements in paragraphs MOBILIZATION and DEMOBILIZATION.

- i. Soil Handling Plan. Elements of the plan must include excavation of contaminated soils (refer to Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS and Section 31 00 00 EARTHWORK); storage of the feed soils; conveyance of soils through the pretreatment and soil washing process; storage of treated soils until sampling is completed; segregation of soils that meet the post-treatment criteria for on-site [backfilling][re-deposition] versus soils requiring off-site disposal; and excavation backfilling (using treated soils or clean borrow soils). This plan needs to account for and balance the following: factors: minimizing the open excavation area for safety and minimization of rainfall contact with contaminated soils; optimizing and matching of the daily capacity of the soil washing treatment system with the daily soil excavation volumes and capacity for final deposition of the treated soils (including post-treatment sampling and analysis timeframe); minimizing of pre- and post-treatment soil storage volumes that must also fit available treatment system footprint area; and soil storage area [cover][liner][stormwater] diversion measures to prevent direct contact of precipitation with pre- and post-treatment soils. This plan must include appropriate drawings and specifications for the various soil handling operations and storage areas for review.
- j. Permits, certifications, [and][or] substantive regulatory requirements necessary for the configuration, installation, operation, and closure of the soil washing treatment plant. For those permits, certifications, [and][or] substantive regulatory requirements which have not been obtained, provide a copy of these applications. Possible permits or substantive regulatory requirements that may be applicable include [air emissions from the soil washing operation (e.g., particulates, fugitive emissions from extraction [solvent][reagent]] [washwater treatment discharge (e.g., national pollutant elimination system discharge to surface water body or direct discharge to municipal publicly owned treatment works)].
- [ k. Bench-Scale Treatability Study Test Report: After completion of testing, compile the data from the treatability study and propose the conditions to be tested in the Field Demonstration. Submit the Bench-Scale Treatability Study Test Report, describing the protocol and results for the treatability study that addresses, but is not be limited to, the materials, procedures, and methods used in the study; tests performed; sampling and analysis; mass balance and performance evaluation; and results, conclusions with supporting dialog, and recommendations.]

\*\*\*\*\*  
**NOTE: It would be normal practice that a Field Demonstration Plan be included as part of the Soil Washing Work Plan unless a separate submission is required by the regulator or due to site circumstances and schedule. If a separate Field Demonstration Work Plan is required, the specification should be edited to include that requirement, including schedule and reviews.**  
\*\*\*\*\*

- l. Field Demonstration Plan. This plan must address, but not be limited to, the following: contaminated feed soil characterization (including the contaminant concentrations as a function of grain size to evaluate consistency with the bench-scale treatability study; proposed



demonstration testing runs (including verification [and][or] optimization of the washwater mix design and [testing][operating] conditions and other key operating parameters for the unit [processes][operations] for each run); sampling protocol, locations, and analytical methods to verify that the design output criteria have been met, including required particle size separation, target contaminant concentration distribution; attainment of soil cleanup levels for any on-site re-deposition, and attainment of [permit][substantive] regulatory criteria; overall mass balance calculation and performance evaluation; and soil and waste characterization of any treatment residuals requiring disposal (e.g., washwater treatment sludges). In addition, the day-to-day log of operations and adjustments to optimize the treatment system must be included in the appendices.

#### 1.4.1.7 Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP)

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**NOTE:** This section may reference a separate specification section requiring preparation of a quality assurance project plan or may be excluded entirely if the requirements are part of another specification section.

Indicate in this paragraph if the UFP-QAPP should include any testing protocols specific to the contaminated soil matrix and soil washing technology (e.g. filtering or homogenizing samples if larger contaminant debris may be present).

\*\*\*\*\*

Prepare a Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) in accordance with the requirements set forth in EPA 505-B-04-900A and using the UFP-QAPP WKSTS. Tailor the content to the requirements of the project and the site conditions and media of interest and address the collection of chemical and physical data necessary to make operational decisions. Prepare [draft for Government review] [draft-final for [regulatory][\_\_\_\_\_] review] and final versions of the UFP QAPP. Allow [30][\_\_\_\_\_] calendar days for [Government] review [and [30][\_\_\_\_\_] calendar days for regulatory review]. Allow [45][\_\_\_\_\_] days for comment resolution following each review and preparing the next version of the document. Do not perform work at the site, with the exception of site inspection and surveys, until the UFP-QAPP is approved.

#### 1.4.2 Performance Requirements

##### 1.4.2.1 Contaminant Concentrations

\*\*\*\*\*

**NOTE:** The table in this paragraph should be developed based on site-specific contaminants of concern and regulatory requirements.

Planned post-treatment criteria, as well as sampling and analysis requirements, should be reviewed by regulatory agencies in the early stages of design. These criteria generally consist of cleanup levels and/or contaminant limits derived from risk-based requirements, Toxicity Characteristic Leaching

Procedure (TCLP) limits, Synthetic Precipitation Leachate Procedure, Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs), and RCRA delisting requirements. Coordinate backfilling with Section 31 00 00 EARTHWORK to ensure geotechnical parameters are specified.

Two approaches are provided for attaining performance criteria: meeting performance criteria for every sample of treated soil (conservative approach) or meeting performance criteria on the average for multiple samples of treated soils from a defined soil volume or decision unit (e.g., soil stockpile). For purposes of waste characterization, collected soil sample(s) must be considered representative of the total waste stream.

\*\*\*\*\*

The concentrations of the contaminants in the treated coarser or finer grained soils intended for on-site re-deposition must not exceed the post treatment criteria specified in Table 2. The determination for attaining the post-treatment criteria will be based on applicable sampling protocol described in the UFP QAPP. Examples of possible post-treatment criteria include the following: [Each sample of post-treatment soil must meet the criteria shown in Table 2.] [An average of all samples of treated soil must meet the performance criteria in Table 2 with no individual sample greater than [\_\_\_\_\_] [110 percent] of the criteria in Table 2 and with no more than [\_\_\_\_\_] [20 percent] of the samples exceeding.] Projected removal efficiencies for the finer grained soils should at least be consistent with the levels identified during the bench-scale treatability and design steps. Post-treatment soils that do not meet the post-treatment criteria must either be re-treated until the applicable criteria are met or staged for off-site disposal.

TABLE 2 - POST TREATMENT CRITERIA		
PARAMETER	CLEANUP LEVEL IN TREATED MATERIAL	
	TOTAL CONCENTRATION IN TREATED MATERIAL	TCLP EXTRACT LIMIT
[_____]	[_____] mg/kg	[_____] mg/L

#### [1.4.2.2 Cut Size Requirement

\*\*\*\*\*

NOTE: This paragraph should be deleted if removal of contaminants is not dependent upon separation of contaminated fine particles (i.e., entirely due to solubilization or other removal techniques). This paragraph provides options for either the design engineer to specify or the Contractor to choose the cut size requirements. The feed materials at a given site may have different physical and chemical characteristics. Therefore, during soil washing treatment, different cut sizes may be used so that the treated materials will meet the post-treatment criteria. If the design engineer chooses to specify

the cut size, and if treatment involves a variety of cut sizes, then the different cut sizes should be specified for different feed materials.

\*\*\*\*\*

Cut size is the targeted grain size used to define the demarcation of the coarse and fine grained soil fractions of the feed materials to be separated during the soil washing operation. Cut size specification for purposes of soil particle size separation design to attain the post-treatment criteria must be identified by the Contractor based on experience and bench-scale [treatability][pilot] study results. Each selected cut size with supporting documentation must be submitted for review prior to implementation. The supporting document must include information correlating contaminant concentrations for the various size fractions based on the grain size distribution.

#### 1.4.2.3 Spent Washwater Treatment and Disposal Requirements

\*\*\*\*\*

NOTE: These paragraphs provide the generic requirements for washwater treatment and disposal, solid waste treatment and disposal, and emission and dust control. These paragraphs should be modified based on the site specific design of the soil washing treatment plant and regulatory requirements. The spent washwater should be treated if necessary and reused, discharged in accordance with applicable regulations (federal, state, and local), or sent for offsite disposal.

Modify this paragraph to reflect the following site-specific requirements.

If a performance specification is prepared, the treatment and disposal requirements should be specified based on the conceptual/process design and applicable regulations. Table 3 should be presented to list the disposal/discharge criteria for the contaminants of concern in accordance with regulatory requirements. If the specification is prepared based on detailed design, the detailed design requirements describing the treatment and disposal scenario as well as the unit processes/operations employed should also be specified.

If sent for off-site disposal, spent washwater should be characterized to determine whether it constitutes a RCRA hazardous waste in accordance with RCRA Identification and Listing of Hazardous Wastes or applicable state regulations. The "derived-from" rule requires treatment residues from the treatment of RCRA listed waste to be managed as listed waste. If the spent washwater is classified as a hazardous waste, a determination should be made as to whether additional treatment is required to comply with RCRA land disposal restrictions. In addition, the requirements in RCRA Standards for Generators of Hazardous Waste and applicable state

regulations should be identified and satisfied. If other washwaters are treated along with the spent washwater, they should be mentioned in this paragraph. These washwaters may include, for example, the rainfall run offs from the stockpiles of feed oversize, feed soils, treated soils, and process sludge; and the washwaters generated from onsite treatment of feed oversize, process sludge, and/or spent process treatment materials.

In the event the project is performance-based, Table 3 will be left blank, and the Contractor must define the spent washwater permit or substantive discharge criteria in the Soil Washing Work Plan.

\*\*\*\*\*

The spent washwater must meet the criteria presented in Table 3 at the time of [disposal][discharge].

TABLE 3 - SPENT WASHWATER DISPOSAL/DISCHARGE CRITERIA	
PARAMETER	DISPOSAL/DISCHARGE CRITERIA
[_____]	[_____] mg/L

#### 1.4.2.4 Solid Waste Treatment and Disposal Requirements

\*\*\*\*\*

NOTE: Solid wastes generated during the plant operation may include feed oversize, process sludge, and/or spent process treatment materials. One treatment and disposal scenario for each of these solid wastes should be clearly defined. If a performance specification is prepared, the treatment and disposal requirements should be specified based on the conceptual/process design. Table 4 should be presented to list the disposal criteria for the contaminants of concern for each of the solid wastes. The applicable federal, state, and local regulations specifically related to the site should be identified. If the specification is prepared based on detailed design, the description of the treatment and disposal scenario as well as the individual treatment components should also be specified.

If secondary solid, liquid, and gaseous wastes are generated by onsite treatment, their treatment and disposal requirements should be addressed in the same manner as the solid, liquid, and gaseous wastes generated by the treatment plant. If the liquid wastes are treated along with the spent washwater, their treatment and disposal requirements should be addressed in the paragraph entitled SPENT WASHWATER TREATMENT AND DISPOSAL REQUIREMENTS. Similarly, the gaseous wastes can also be addressed in the paragraph titled EMISSIONS AND DUST CONTROL.

\*\*\*\*\*

The[ oversize debris, rocks, minor quantities of clayey soil clumps too large to be processed, etc. screened out of the feed soils][ washwater process sludge][ fine grained soils not meeting treatment criteria][ spent process treatment soil][\_\_\_\_\_] from installation, operation and closure of the treatment plant must be properly treated [and][or] disposed to the levels specified in Table 4. Spent process treatment material is the process treatment material for which the capacity to remove contaminants from the contaminated medium in a treatment process has been used or exhausted (e.g., spent adsorbent media from washwater treatment). The Contractor must present the waste characterization data and identify disposal options for all applicable media in the Soil Washing Work Plan.

TABLE 4 - SOLID WASTE DISPOSAL CRITERIA		
	DISPOSAL CRITERIA	
PARAMETER	CONCENTRATION LEVEL IN TREATED SOLID WASTE	TCLP EXTRACT LIMIT
[_____]	[_____] mg/kg	[_____] mg/L

#### 1.4.2.5 Emissions and Dust Control

\*\*\*\*\*

**NOTE:** Specifications for emission and dust controls should be provided in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. The remaining text in this note discusses soil washing technology-specific emission and dust control considerations to incorporate into Section 01 57 19. An air pathways analysis should be performed during design in accordance with EP 200-1-24 Air Pathway Analysis for the Design of Hazardous, Toxic and Radioactive Waste (HTRW) Remedial Action Projects. Depending upon the contaminants of concern in the contaminated soils, the unit processes/operations employed in the treatment plant, the amount of pollutants emitted, and the geographical location of the site, the emission standards and limitations for certain contaminants and dust control can be identified from the following regulations including, but not limited to, National Primary and Secondary Ambient Air Quality Standards, National Emission Standards for Hazardous Air Quality Pollutants, and state and local regulations.

Based on the regulatory requirements, the proper technologies or apparatus for the emissions control if required can be determined. Upon completion of the design of the treatment plant, these emission requirements and control technologies should be defined by the design engineer.

If a performance specification is prepared, the emissions, dust sources, and contaminants of concern should meet specified requirements based on applicable regulations. Section 01 57 19 should list the emissions criteria for the contaminants of

concern for each emission and dust source, and if applicable, monitoring requirements should be specified. The applicable federal, state, and local regulations should also be identified. If the specification is prepared based on detailed design, the technologies or apparatus for controlling the emissions and dust sources should also be specified.

\*\*\*\*\*

Provide and operate a soil washing treatment system which meets the emissions and dust control requirements in [Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS][\_\_\_\_\_].

#### 1.4.2.6 Noise Control

\*\*\*\*\*

NOTE: Specifications for noise controls should be covered in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS. The remaining text in this note discusses soil washing technology-specific emission and noise control considerations to incorporate into Section 01 57 19. Based on the geographical location of the site, and the land uses and environment surrounding the site, the site-specific noise level requirements for the day and night operations and monitoring requirements can be identified from the state and local regulations and/or developed by interacting with the state and local agencies. These requirements should be specified in this paragraph.

\*\*\*\*\*

Provide and operate a soil washing treatment system which meets the noise control requirements in [Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS] [\_\_\_\_\_].

#### 1.5 SUBMITTALS

\*\*\*\*\*

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for

Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy and Air Force projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

\*\*\*\*\*

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Pre-Installation Meeting Agenda

Pre-Installation Meeting Minutes; G, [\_\_\_\_\_]

Bench-Scale Treatability Study Work Plan; G, [\_\_\_\_\_]

Soil Washing Work Plan; G, [\_\_\_\_\_]

Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP); G, [\_\_\_\_\_]

Pre-Installation Equipment Examination

Pre-Installation Examination Report

#### SD-05 Design Data

Adjusted Design; G

#### SD-06 Test Reports

Field Demonstration Report; G, [\_\_\_\_\_]

Water Supply Analysis

Operations Reports

#### SD-07 Certificates

Reagent Certificates of Analyses

Qualifications; G, [\_\_\_\_\_]

### 1.6 QUALITY CONTROL

#### 1.6.1 Regulatory Requirements

\*\*\*\*\*

NOTE: The appropriate regulatory agencies should be consulted to obtain their approval of work plans, specifications, drawings, and on the sampling methodology for a soil washing treatment project.

Additional references from federal, state, and local regulatory requirements; utility company regulations; and applicable codes and standards published by scientific and engineering institutions should be included where appropriate in the body of the specification. Some of the potentially applicable Federal regulations are listed as follows:

TCLP

Permitting

National Primary and Secondary Ambient Air Quality Standards

National Emission Standards for Hazardous Air Quality Pollutants

State and Local Air Quality Standards

National Pollution Discharge Elimination System (NPDES) Discharge Limitations and Permit Procedures

Hazardous Waste Identification and Standards  
Applicable to Generators, Transporters, and Owners  
and Operators of Treatment, Storage and Disposal  
Facilities (TSDF)

Land Disposal Restrictions (LDRs)

Department of Transportation Hazardous Materials  
Program Procedures

Hazardous Materials Transportation Regulations

Land Disposal of Low-Level Radioactive Waste

Packaging and Transportation of Radioactive Materials

For sites addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), administrative permit requirements for on-site activities are not required, though the substantive requirements may need to be met. Permitting requirements known to have substantive requirements should be listed here. If permit requirements are covered in other specifications, delete this section.

\*\*\*\*\*

Obtain the permits, permit equivalents and certifications; and meet the substantive regulatory requirements necessary for the installation, operation, and closure of the project.[ Correspondence from regulatory agencies, and other relevant information, is attached to the



specifications to indicate the level of effort necessary to obtain finalized permits, permit equivalents, certifications and to meet substantive regulatory requirements.]

#### 1.6.2 Qualifications

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NOTE: Requirements for the Contractor's experience should be determined and specified based on the experience, availability, and advancement of the soil washing technology industry and the site-specific requirements. If soil washing is being used for unique contaminants, consider specifically identifying contractor soil washing experience requirement for those contaminants in the optional bracket at the end of the paragraph CONTRACTOR EXPERIENCE.  
\*\*\*\*\*

##### 1.6.2.1 Contractor Experience

Demonstrate a minimum of [three][\_\_\_\_\_] years of experience in the field of soil washing or the successful completion of [at least [one][\_\_\_\_\_] soil washing project of comparable size and scope][at least [three][\_\_\_\_\_] soil washing pilot scale treatability studies, demonstration studies, [and][or] full scale remediation projects that required handling and transportation of soils contaminated with [RCRA hazardous wastes][CERCLA hazardous substances][\_\_\_\_\_] ].

##### 1.6.2.2 Key Personnel

Provide key personnel with a minimum of [three][\_\_\_\_\_] years of soil washing field experience. Include soil washing unit operators, quality control personnel, supervisory engineering, and technical staff involved with the soil washing unit operation in key personnel. Submit a list of these personnel with their qualifications.

##### 1.6.2.3 Lab Validation

Perform testing by a DoD Environmental Laboratory Accreditation Program (DoD ELAP) accredited commercial testing laboratory meeting the requirements of [Section 01 45 00 QUALITY CONTROL][\_\_\_\_\_] and approved by the Contracting Officer. Submit testing laboratory validation for the testing to be performed. Do not permit work requiring testing until the Contracting Officer approves use of the testing laboratory.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Safely transport, store, and handle equipment and raw materials (including extraction [solvents][reagents]). Package and ship these items in compliance with United States Department of Transportation (USDOT) requirements. Ensure that extraction [solvents][reagents] are shipped in properly labeled containers with instructions for handling and storage. Store and handle these items onsite in accordance with the manufacturer's recommendations and in compliance with applicable regulatory requirements. Store sufficient quantities of the required extraction [reagents][additives] in the plant area to support the operation of the treatment plant. Do not exceed the extraction [solvent][reagent] holding times.

## 1.8 PROJECT/SITE CONDITIONS

### 1.8.1 Environmental Requirements

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NOTE: When temperature is below the freezing point, the treatment plant equipment may not function properly or efficiently. Frozen soils can make excavation, conveying, screening, and blending operations difficult and less cost-effective. The general practice is to avoid the operation of an outdoor treatment plant during extreme winter weather. In places where there is a long winter season or in projects where the plant operation is required throughout the year to meet the project schedule, it may be necessary to perform soil washing inside a temporary building with proper heating and ventilation.

Two options are provided. The first option is more restrictive and does not allow the Contractor to operate in adverse environmental conditions. The second option requires that the Contractor develops plans to mitigate adverse environmental conditions.

\*\*\*\*\*

[Do not implement soil washing during winter [conditions][temperatures] (e.g., ambient temperature below [0][\_\_\_\_\_] degrees C [32][\_\_\_\_\_] degrees F.][It is not recommended to implement soil washing during winter [conditions][temperatures] (e.g., ambient temperature below [0][\_\_\_\_\_] degrees C [32][\_\_\_\_\_] degrees F due to the mechanical and logistical issues associated with the required equipment and soil handling requirements, which includes use and treatment of water. If there is a need to operate during winter conditions, include in the Soil Washing Work Plan an appropriate structure [and][or] heat tracing and other appropriate operating procedures to minimize downtime due to freezing.][ It is also not recommended to perform soil washing during periods of heavy rainfall if this will interfere with the effective operation of the treatment plant, because of adverse impacts to soil handling or particle size separation operations.] Do not perform operations during inadequate daylight or at night unless sufficient lighting is available for treatment plant operation.[ Section 26 56 00 EXTERIOR LIGHTING for illumination.]

### 1.8.2 Existing Conditions

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NOTE: The pertinent site characterization data should be placed in the appendix of the specifications or on the drawings and referenced here. If the contaminated soils to be treated contain a significant amount of feed oversize (aka debris), the available information about its extent and characterization should also be provided. Indicate the detail to which site characterization has been performed and indicate where obvious data gaps exist. The information should also include construction limits, property utilities, chemical data, geotechnical data, sampling locations, and

boring logs. The locations and details (such as utility point of contact, sizes, capacities, and flows) of the utility hookups should also be provided for the Contractor's use.

Indicate if there are multiple dissimilar types of contaminated materials that will require different soil washing operations. Materials may be considered dissimilar based on possessing different soil properties, types of contaminants, or relative concentrations of contaminants. Determination of dissimilar materials may be based on site investigations and/or previously completed treatability studies.

\*\*\*\*\*

Available information that describe existing site conditions are presented [in Appendix [\_\_\_\_]] [and ] [on the Drawings]. This includes [ physical configuration] [ utilities] [ topography] [ land uses] [ geotechnical characteristics of the contaminated soils (including [ grain size analysis] [ total organic content] [ cation exchange capacity] [ pH] [ moisture content] [ density] [ porosity]) ] [ hydrogeology] [ and ] [nature and extent of contamination] [\_\_\_\_]]. The existing conditions presented are the result of site investigations at specific locations; variations in the existing site conditions could occur. Perform an independent interpretation of the site characterization data. Notify the Contracting Officer within [48 hours] [\_\_\_\_] if discrepancies between the data provided and actual field conditions are discovered. The Contractor must communicate any additional data needs to complete the soil washing design to the Contracting Officer.

#### [1.8.3 Results of Previously Conducted Treatability Studies

\*\*\*\*\*

NOTE: This paragraph should be deleted if no previous treatability studies have been conducted.

In some instances, the Government will have conducted treatability studies prior to advertisement for bids. Results of these treatability studies are generally provided to bidders and included in the contract documents. In most instances, the Contractor will perform the bench-scale treatability studies to support its full-scale design (i.e., soil washing contractors typically perform turnkey design/construction, and operation and maintenance services as the subject matter expert for this technology).

The unit processes/operations employed in the previous treatability studies (bench and/or pilot scale) may not be the same as those proposed by the Contractor. Documentation of the previous treatability studies should provide prospective Contractors with sufficient information to prepare a detailed proposal and should include the testing soils, procedures and conditions, sampling and analytical methods, evaluation, and results.

\*\*\*\*\*

The previously conducted treatability study documents in Appendix [\_\_\_\_\_] are for information purposes only. The results indicate that soil washing is capable of meeting the post treatment criteria identified in this Section. Nevertheless, perform an independent evaluation of these studies and results. If deemed necessary, perform additional bench-scale treatability studies [at the Contractor's own expense] to confirm the previously conducted treatability studies and results. Based on the Contractor's own interpretation of the previous studies and results [and the Contractor's own studies and results], provide a full-scale treatment plant which meets the requirements identified in this Section.

## ]PART 2 PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

#### 2.1.1 Water Supply

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NOTE: Two options are provided. The first option is to only allow the Contractor to use potable water. The second option allows the Contractor to use non-potable water, but includes a testing requirement to limit the chance that the Contractor supplies a water that could introduce contaminants into the treated materials. The first option is simpler, but could lead to higher project costs if the volume of water needed is significant and/or potable water sources are not readily available. When specifying the chemical contaminant criterion to be met for water, the Designer should consider if there are other standards which are more appropriate for the specific project (e.g. state groundwater cleanup criteria).

\*\*\*\*\*

Supply water used to facilitate soil washing.[ Use only potable water from a regulated public water system.][ If non-potable water is to be used, provide water that does not contain oils, acids, salts, alkalis, organic matter, solids or other substances at concentrations that could be detrimental to the successful treatment of the contaminated materials. Also characterize non-potable water prior to its use by collecting a sample from the water source and analyzing according to the following table. Submit a [Water Supply Analysis](#) demonstrating that water meets requirements.

TABLE 5 - TREATMENT WATER CRITERIA		
Chemical Contaminants		
ANALYTICAL METHOD NUMBER From <a href="#">EPA SW-846</a>	ANALYSIS TYPE	CRITERION TO BE MET

TABLE 5 - TREATMENT WATER CRITERIA		
Chemical Contaminants		
6010 [and 7470A]	Metals [and Mercury]	[Less than Maximum Contaminant Level (MCL)] [_____]
8260	Volatile Organics	
8270	Semi-volatile Organics	
8082	PCBs	
1633	PFAS	
8081	Pesticides	
Within each Analytical Method, only analyze for analytes which have a [MCL] [_____].		

]

#### 2.1.2 Extraction Solvent/Reagent Certificates of Analyses

The treatment plant may use [reagents][additives] for formulation of washwater, treatment of spent washwater, control of air emissions, and treatment of solid wastes. The residuals of these [reagents][additives] in the treated soils or the solid, liquid and gaseous wastes from the treatment plant must not cause secondary contamination to the environment. The parameters for each [reagent][additive] to be provided must include, but are not limited to, chemical formula, [grade][purity], form, strength, and typical supplier. Provide a Reagent Certificates of Analysis with each shipping unit of reagent. A confidentiality agreement may be requested if proprietary extraction [solvents][reagents] are being used.

#### 2.1.3 Samples For Bench-Scale Treatability Studies

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**NOTE:** This paragraph should be included if treatability studies are to be performed by the Contractor. Action level criteria should be specified for the purpose of collecting representative samples for treatability studies. Table 6 should be developed based on site-specific contaminants of concern and their corresponding action levels. Since the action level criteria are also applicable to excavation, coordination between this section and the section dealing with excavation and stockpiling should be made with respect to these criteria.

To reduce the overall risk to the government, it is strongly advised that the project team should require the Contractor to collect samples for the bench-scale test unless the nature of the site is preventing the Contractor to do so. Depending on site conditions and project needs (e.g. site security, access issue, etc.), the government may provide samples to the Contractor to conduct

## bench-scale tests.

\*\*\*\*\*

[The Contracting Officer will provide the required samples to conduct the bench-scale treatability study.][Select sampling locations and collect representative samples to conduct the bench-scale treatability study. The soil sampling protocol, locations, volume, and analytes will be included in the Bench-Scale Treatability Study Work Plan. Consider the existing site conditions presented in paragraph EXISTING CONDITIONS when selecting sampling locations. Multiple samples may need to be collected to obtain optimal information regarding the soil washing efficacy over a range of site lithology mix and contaminant concentrations that may be processed.][Conduct sample collection activity in the presence of Contracting Officer.]] The collected treatability study samples for bench-scale treatability study testing must have contaminant concentrations representative of[ the average contaminant concentrations and site lithology mix,][ greater than the action level criteria presented in Table 6,][ projected worst-case contaminant concentrations that may be processed from different areas,][ and ][different mixes of fine- and coarse-grained lithology mixes that may be processed from different areas]. Otherwise, repeat sampling until the above criteria are successfully met. Test samples of contaminated soils intended to be used in the bench-scale treatability studies in accordance with procedures in paragraph CONTAMINATED SOILS TREATMENT TESTING. Do not commence treatability studies until contaminated soil sample results meet the aforementioned concentration and soil lithology mix criteria and approved by the Government.

TABLE 6 - ACTION LEVEL CRITERIA	
PARAMETER	ACTION LEVEL CRITERIA
[_____]	[_____] mg/kg

## ]PART 3 EXECUTION

### 3.1 EXAMINATION

#### 3.1.1 Pre-Installation Equipment Examination

Conduct a pre-installation examination of the treatment plant equipment versus specifications, as well as for any damage, defect, and dilapidation. Document the results of the pre-installation examination and submit to the Contracting Officer for review and documentation. Upon completion of the treatment plant installation, perform a pre-operational test of the equipment and controls under operating conditions using clean water to check for leaks, continuity, and functionality of operating controls and shutdown alarms. The Contracting Officer may conduct an independent examination to ascertain the condition and functionality of the equipment. Based on this examination, the Contracting Officer has the right to reject the entire system or any damaged, defective or dilapidated equipment. The cost associated with equipment or control replacement or repair, and delays caused by the rejection must be borne by the Contractor. Routinely and properly inspect and maintain the equipment to provide the operation of the treatment plant as required by the Contract schedule. Schedule delays and costs due to lack of inspections and maintenance, power failure, line plugging, improper functioning of equipment and controls, unavailability of labor and materials, etc. are

the responsibility of the Contractor. Provide [alternate][auxiliary] power source if sufficiently reliable sources are not available.

### 3.1.2 Infrastructure Conditions

Conduct a pre-installation examination of the on-site infrastructure, utility conduits, monitoring points, and site access constraints. Photographically document, with identifying labels, the existing condition of infrastructure and utilities, particularly for comparison to post-operation conditions. Verify locations of critical utilities that cannot be disrupted and those utilities that would potentially have significant impacts on operations and public safety. Submit a [Pre-Installation Examination Report](#) documenting the examination activity. Obtain all necessary utility clearances before initiation of subsurface work.

### [3.1.3 Bench-Scale Treatability Study

\*\*\*\*\*  
**NOTE: If a Treatability Study has previously been performed or is otherwise not needed, delete this paragraph. To reduce the chances of using soil samples that are not representative of site conditions, a minimum volume of 4 liters 1 gallon is recommended for each condition to be tested in the treatability study.**  
\*\*\*\*\*

Perform at least [three][\_\_\_\_\_] replicate tests simultaneously for each proposed operating condition. Homogenize and divide the contaminated soil into replicate volumes prior to initiating testing in accordance with the Bench-Scale Treatability Study Work Plan requirements. Do not use less than less than [four][\_\_\_\_\_] liters [one][\_\_\_\_\_] gallons of contaminated soil in each replicate. Test samples of treated soils in accordance with procedures in paragraph CONTAMINATED SOIL TREATMENT TESTING.

## ]3.2 PREPARATION

### 3.2.1 Mobilization

\*\*\*\*\*  
**NOTE: Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES includes requirements for decontaminating equipment that has been used in contaminated zones. That section should be modified to extend decontamination/cleaning requirements to equipment being brought on-site to cover the requirements of this paragraph.**  
\*\*\*\*\*

Follow the approved mobilization and demobilization plans submitted as part of the Soil Washing Work Plan. Do not mobilize the treatment plant to the site until the [Soil Washing Work Plan][UFP-QAPP] has been approved by the Contracting Officer and the Contractor has received written confirmation. Delays caused by the Contractor's failure to meet regulatory requirements must result in no additional cost to the Government. In accordance with [Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES][\_\_\_\_\_] , the

equipment which is rented [and][or] previously used for other site remediation must be decontaminated and tested for contaminants of concern before being brought to the site.

### 3.2.2 Clearing and Grubbing

\*\*\*\*\*

NOTE: If Section 31 11 00 CLEARING AND GRUBBING is not included in the projects specifications, include clearing and grubbing requirements here. Clearing and grubbing requirements should specify limits of work, methods of cutting pavement, how salvageable items such as fencing will be managed, and how waste materials generated from clearing and grubbing will be disposed, particularly if activities occur within areas of contamination.

\*\*\*\*\*

Perform clearing and grubbing in accordance with Section 31 11 00 CLEARING AND GRUBBING.

### 3.2.3 Foundations

\*\*\*\*\*

NOTE: Minimum requirements should be specified in the Soil Washing Work Plan for the foundation/containment area of the treatment plant. An option is provided at the end of the paragraph to require installing a liner and berm in the location where the soil washing treatment plant will be constructed; this option addresses cross-contamination risk if the treatment plant is located on non-contaminated ground.

\*\*\*\*\*

Construct equipment foundations in accordance with the approved Soil Washing Work Plan. Grade the area around the soil washing treatment plant so that the water drains away from the work area adjacent to the treatment area.[ Construct a liner and berm surrounding the soil washing treatment plant. Construct the liner and berm [in accordance with the stockpile liner and berm requirements in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.][\_\_\_\_\_]].

### 3.2.4 Stockpiles of Contaminated Soils

\*\*\*\*\*

NOTE: Sufficient area should be prepared for stockpiling untreated and treated contaminated soil based on consideration of equipment production rates, allowable stockpile sizes, and overall project schedule. If Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS is not included in project specifications, copy stockpiling information from paragraphs EXCAVATION WORK PLAN, GEOMEMBRANE, CONTAMINATED MATERIAL STORAGE, and SAMPLING BENEATH STORAGE UNITS into this section.

Background sampling under the stockpiles of contaminated soils should be performed before their



construction, unless previous information is  
adequate. Coordinate with Section 02 61 13  
EXCAVATION AND HANDLING OF CONTAMINATED SOIL.

\*\*\*\*\*

Prepare areas that will be used to stockpile untreated and treated  
contaminated materials in accordance with Section 02 61 13 EXCAVATION AND  
HANDLING OF CONTAMINATED MATERIAL. Provide sufficient area to stockpile  
[\_\_\_\_][ metric tons][ tons] of untreated contaminated material and  
[six][\_\_\_\_] stockpiles of [500][\_\_\_\_][ metric tons][ tons] of treated  
contaminated material.

### 3.3 ERECTION, INSTALLATION, AND DEMOBILIZATION

\*\*\*\*\*

**NOTE:** Referenced UFGS should be edited to include  
only the minimum requirements applicable to a  
temporary installation.

\*\*\*\*\*

Erect and install the treatment plant in accordance with applicable  
action-specific and location-specific federal, state, and local  
regulations. If the technical specifications overlook [and][or] conflict  
with the applicable codes, standards, [and][or] regulations, inform and  
consult with the Contracting Officer for interpretation. Erect and install  
the treatment plant on a temporary basis so that it can be readily removed  
from the site after completion of the contract work. Perform the erection  
and installation such that there is minimal damage to the existing site  
environment.

Complete the mechanical work in accordance with Section 23 30 00 HVAC AIR  
DISTRIBUTION. Complete the electrical work in accordance with[ Section  
33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION][ Section 33 71 02  
UNDERGROUND ELECTRICAL DISTRIBUTION][\_\_\_\_],[ and ][Section 26 20 00  
INTERIOR DISTRIBUTION SYSTEM]. Complete the plumbing work in accordance  
with[ Section 22 00 00 PLUMBING, GENERAL PURPOSE][ Section 40 05 13  
PIPELINES, LIQUID PROCESS PIPING][\_\_\_\_].[ Refer to Section 46 07 13.13  
PRECIPITATION, COAGULATION, AND FLOCCULATION for respective treatment  
requirements related to the removal of suspended solids as part of the  
washwater treatment; as well as Section 46 61 00 FILTRATION for respective  
requirements for the removal of colloidal suspended particulates as part  
of the washwater treatment.]

### 3.4 FIELD DEMONSTRATION

\*\*\*\*\*

**NOTE:** The need for a formal Field Demonstration  
should be discussed with the Contracting Officer and  
would be a function of the uncertainty of the  
materials to be treated. For well-defined  
contaminants and soil compositions that are known to  
be amenable to soil washing, data obtained from the  
bench-scale treatability study or full-scale system  
startup should be adequate to negate the need for a  
formal Field Demonstration, and a written waiver  
will then be issued by the Contracting Officer. If  
the amenability of the contaminants/soil composition  
is not known to be amenable to soil washing, then a  
formal Field Demonstration in accordance with the

following requirements will need to be performed. If a formal "Field Demonstration" is not required, sufficient startup testing should be done to validate performance prior to ramping up to full-scale operation.

If processing of contaminated material must stop pending field demonstration results, the contract should contain provisions for issuing a second notice (or third notice in project where treatability studies are performed) to proceed by Contracting Officer upon approval of the field demonstration.

This paragraph is prepared based on a continuous operation of the treatment plant. If the treatment plant is operated as a batch process, the requirements on the minimum operation time and the sample frequency should be modified accordingly.

\*\*\*\*\*

Prior to full scale soil washing operations, perform a field demonstration at the full scale throughput capacity to verify the performance of the treatment plant. Perform preliminary tests and system checkout prior to the field demonstration in order to minimize problems during the field demonstration. Conduct each field demonstration run for a minimum period of [eight][\_\_\_\_\_] hours per day for at least [two][\_\_\_\_\_] days. Perform field demonstration run on each dissimilar type of soil or contaminant which requires a substantial change in treatment plant operating conditions.

#### 3.4.1 Full Scale Processing Equipment

Use the full scale treatment plant and operating conditions proposed for use during full scale soil washing.

#### 3.4.2 Contaminated Soil Sourcing

\*\*\*\*\*

NOTE: Prior to implementing the field demonstration, chemical testing should generally be performed to verify that the soils to be used for the test run contain the contaminants of concern at high enough concentrations to adequately test the system. Additional testing may be warranted to verify that the physical properties of the soils are also representative of site conditions. If paragraph SAMPLES FOR BENCH-SCALE TREATABILITY STUDIES is deleted, copy the range of contaminant concentrations and soil lithology requirements into this paragraph.

\*\*\*\*\*

Obtain contaminated soils used for the field demonstration from [the location specified by the Contracting Officer][\_\_\_\_\_]. Prior to performing the field demonstration, test, [one][\_\_\_\_\_] initial composite sample(s) of contaminated for chemical analysis per each demonstration run. The contaminated soil samples must be representative of the range of contaminant concentrations and soil lithology mixes as described in

paragraph SAMPLES FOR BENCH-SCALE TREATABILITY STUDIES. Otherwise, repeat sampling until the contaminant concentration levels exceed the action level criteria or upon approval by the Contracting Officer. Test samples of contaminated soils intended to be used in the field demonstration in accordance with procedures in paragraph CONTAMINATED SOIL TREATMENT TESTING. Do not commence the field demonstration until soil samples meet the aforementioned concentration criteria.

#### 3.4.3 Treated Soil Testing

During the demonstration run, collect confirmation samples of the treated soils in accordance with the UFP-QAPP. Examples of confirmation sampling of the treated soils include [composites samples][\_\_\_\_\_] every [two][\_\_\_\_\_] hours from the feed soils, [feed oversize][\_\_\_\_\_] spent washwater, effluent from treatment of spent washwater, treated soils, process sludge, and the other locations necessary to perform mass balance calculations and to verify that the treated soils from the soil washing operation meets the post-treatment criteria listed in paragraph PERFORMANCE REQUIREMENTS. Perform testing of the contaminated and the treated soils before and after demonstration test runs in accordance with the same testing protocol as proposed for the full-scale operation described in the UFP-QAPP and paragraph CONTAMINATED SOIL TREATMENT TESTING. If the treated soils produced during the field demonstration do not meet the post-treatment criteria, process an equal quantity of the same type of soils until satisfactory results are attained using properly modified operating conditions [and][or] incorporation of extraction [solvents][reagents] that have been proven effective as part of the treatability testing. Return the treated soils that failed the demonstration testing to the contaminated soils stockpile for re-processing during full-scale treatment.

#### 3.4.4 Field Demonstration Test Results

\*\*\*\*\*

**NOTE: Two options are provided for the next step after the field demonstration. The first option (halting processing contaminated soils until results from the field demonstration testing indicate the Contractor's proposed operating conditions can successfully treat the contaminated soils) would generally only be appropriate if the soil washing treatment process has yet to be demonstrated on a large scale for the specific contaminants and soil composition.**

\*\*\*\*\*

After completion of the field demonstration, [do not process additional contaminated soil until written approval has been received from the Contracting Officer, and the following submittals have been approved: [ [Field Demonstration Report](#)][\_\_\_\_\_] Allow [10][\_\_\_\_\_] working days in the schedule for Government review and approval of the Field Demonstration Report.]] contaminated soils may continue to be processed. However, if test results indicate that treated soils do not meet the post treatment criteria listed in paragraph PERFORMANCE REQUIREMENTS, the contaminated soils treated with the failed operating conditions must be reprocessed at no additional cost to the Government.]

### 3.5 OPERATION

#### 3.5.1 Dissimilar Soils

\*\*\*\*\*  
**NOTE: Delete the bracketed text item if dissimilar materials are not known to be present at time of preparing project specifications.**  
\*\*\*\*\*

Do not mix together dissimilar soils if the bench-scale treatability study [and][or] field demonstration testing results indicate that different operating conditions of the treatment plant have to be implemented to achieve effective treatment of these soils. Materials known to be dissimilar at the site are defined in [paragraph EXISTING CONDITIONS] [\_\_\_\_\_].

#### [3.5.2 Feed Soil Stockpiles

\*\*\*\*\*  
**NOTE: Delete this paragraph if feed soils will already be placed in stockpiles prior to performing the soil washing operation.**  
\*\*\*\*\*

Limit feed soil stockpiles to the number and sizes of soil stockpiles defined in the Soil Handling Plan prepared as part of the Soil Washing Work Plan.

#### ]3.5.3 Feed Oversize

Pre-screening operations should include a combination of removing oversize materials, clayey soil clumps too large to be processed, and debris (e.g., rocks, man-made debris). At the discretion of the Contractor if it will not interfere with the soil washing operation (i.e., clay content too dominant), reduce the size of any clayey soil clumps to less than [2.5 cm 1 inch][the maximum allowable particle size of the soil washing process][\_\_\_\_\_]. Also reduce any oversize contaminated soils which can be reduced to an allowable size for the soil washing process. Remove oversize soil that cannot be reduced to an allowable size for the soil washing process.[ Decontaminate oversize materials in accordance with the procedure developed in the Soil Washing Work Plan]. Dispose of oversize materials off-site in accordance with [Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS][\_\_\_\_\_].

#### 3.5.4 Material Management

\*\*\*\*\*  
**NOTE: During the design, the design engineer should interact with the regulatory agencies to determine the requirements pertaining to the type of storage facility, accumulation time, and permitting for feed oversize, feed soils, treated soils, and process sludge for incorporation into the related subparagraphs.**  
\*\*\*\*\*

Handle soils, washwater, solid wastes, and dust generated during stockpile management as specified in paragraph SYSTEM DESCRIPTION. Manage the soil

stockpiles so no contaminants or fine particles are released into the environment. Control stormwater run on and run off water from contacting the soil stockpile areas. Collect and treat the stormwater runoff and any collected leachate soil from the stockpile areas for discharge/disposal or use for make-up water in the treatment plant.

#### 3.5.4.1 Treated Soils

Handle treated soils per protocol described in the Soil Handling Plan included as part of the Soil Washing Work Plan. Stage treated soils segregated by cut size (i.e., defined finer versus coarser grained soils separated during the soil washing process as discussed in paragraph CUT SIZE REQUIREMENT) into units (stockpiles) for post-treatment testing. Stockpile sizes greater than the soil confirmation sampling decision unit as defined in the UFP-QAPP are prohibited. Manage the treated soils such that specific [batches][runs] can be defined and stored following post-treatment testing either as; clean backfill for on-site redistribution that meets the post-treatment criteria; off-site disposal of finer grained soils that exceed the post-treatment criteria; or coarser grained soils for re-processing that exceeds the post-treatment criteria. The post-treatment criteria are defined in paragraph PERFORMANCE REQUIREMENTS. Conduct backfilling in accordance with Section 31 00 00 EARTHWORK.

#### 3.5.4.2 Treated Soils Above Post-Treatment Criteria

Treated soils that do not meet the post-treatment criteria in paragraph PERFORMANCE REQUIREMENTS must be handled in accordance with direction from the Contract Officer, which could include the re-processing of coarser grained soils if the [treatability][field] demonstration studies determine that the post-treatment criteria should be met; or the segregation of finer grained soils for off-site disposal[ or coarser grained soils if the Contract Officer determines that further re-processing will not be cost effective or would not likely meet the treatment criteria based on, e.g. contaminant concentrations and total fines content]. Dispose of treated soils above post-treatment criteria approved by the Contracting Officer in accordance with Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

#### 3.5.4.3 Treatment Plant Washwater

Recycle [and][or] reuse the washwater generated by the unit operations of the soil washing treatment plant to the maximum extent for plant operations in order to minimize the need for new makeup water and limit the treatment, discharge, [and][or] offsite disposal of washwater. Treated washwater discharged to a regulatory approved receptor, or sent to an offsite treatment facility, must comply with the requirements identified in paragraph SPENT WASHWATER TREATMENT AND DISPOSAL REQUIREMENTS.

#### 3.5.4.4 Stockpile Leachate

\*\*\*\*\*  
**NOTE: Leachate may not need treatment. If treatment is needed, it can be treated and disposed of at an offsite facility or treated along with the spent washwater for reuse, discharge, and/or offsite disposal. If the leachate is classified as derived waste from a listed hazardous waste, it should be**

contained and then characterized.

Coordinate this paragraph with requirements in paragraph SPENT WASHWATER TREATMENT AND DISPOSAL REQUIREMENTS. Typically, water will be treated on a batch basis. If a continuous discharge is anticipated, modify the paragraph accordingly and include sample type and frequency.

\*\*\*\*\*

Characterize the leachate collected from the stockpiles to determine the need for treatment prior to reuse in the soil washing process. Do not discharge the leachate to the environment, or transport it offsite for disposal prior to analyzing for and meeting the discharge requirements in paragraph SPENT WASHWATER TREATMENT AND DISPOSAL REQUIREMENTS. The vessel, impoundment, [\_\_\_\_], storing the leachate must be tested prior to emptying that storage facility. No leachate must be added to a storage facility after a sampling event until the unit is emptied.

### 3.5.5 Change of Operating Conditions

\*\*\*\*\*

NOTE: If adjustment to the mix design is required due to change in feed material characteristics, then the Contractor's adjusted mix design should be evaluated by the Contracting Officer for the extent of changes from the previous mix design. Further, price negotiation may be required based on the extent of changes from the previous mix design.

\*\*\*\*\*

The following two requirements must be met in order to be considered for change of operating conditions: (1) the physical and chemical characteristics of the contaminated soils are significantly different from the originally defined characteristics, and (2) the treatment requirements cannot be met under the current treatment plant design and related operating conditions. When change of operating condition is necessary, notify the Contracting Officer before changes are made to the design and related operating conditions. The Contracting Officer may require the Contractor to perform a field demonstration for significant changes made to the design and related operating conditions in accordance with paragraph FIELD DEMONSTRATION, for approval. If adjustment to the design is required due to change in feed soils characteristics, submit an [adjusted design](#) for the extent of changes from the previous design for approval. Further, price negotiation may be required based on the extent of changes from the previous mix design.

## 3.6 FIELD QUALITY CONTROL

### 3.6.1 Tests

\*\*\*\*\*

NOTE: The amount of post treatment testing performed should be minimized. It is preferable to maintain quality control of the treatment plant by verifying the designed operating conditions during the field demonstration and by monitoring and controlling the operating parameters to achieve the designed performance.

\*\*\*\*\*

The post treatment testing specified in this paragraph is needed by the Government to generate documentation that the soil washing treatment has been accomplished in accordance with performance requirements approved by applicable authorities. The results of these tests may be used as part of the Contractor's QC program; however it is the contractor's sole responsibility to meet the performance requirements specified in this Section. Therefore, it is expected that the Contractor will perform additional testing and measurements to assure that treated soils meet requirements without rejection of batches, retesting, [and][or] reprocessing

#### 3.6.1.1 Contaminated Soil Treatment Testing

\*\*\*\*\*

NOTE: The values shown in Table 7 for frequency of testing are only examples and need to be determined on a site specific basis. It may be acceptable to change the number of samples during development of a UFP-QAPP, but the Designer should attempt to establish a reasonable sampling frequency in the specifications to provide a basis for the Contractor to bid the project.

Time limits for sample shipment, analysis, and reporting of results should be selected based on the analytical costs and the management of stockpiles. The shorter the turnaround time requested, the higher the analytical cost will be. In addition, there are time limits on how fast the requested analyses can be completed. Coordinate with the regulators regarding the maximum quantity of soil volume per composite sample. This will define the size of each stockpile, and the time required to reach this quantity.

The feed oversize is generally handled by either onsite decontamination for backfilling or offsite disposal. The disposal of spent process treatment materials such as activated carbon is generally negotiated as part of the suppliers contract and may not require post treatment testing. Therefore, only treated soils and the process sludge are addressed in this paragraph. Offsite transportation and disposal of feed oversize, spent process treatment materials, and process sludge require manifesting and record keeping for each shipment.

\*\*\*\*\*

Collect samples for post-treatment testing in accordance with the [UFP-QAPP][basewide QAPP][\_\_\_\_\_] and this paragraph. Analyze the samples for the parameters specified in the [UFP-QAPP][basewide QAPP][waste disposal][applicable permit or substantive requirements]. Collect samples for testing at a minimum frequency [provided in Table 7][\_\_\_\_\_]. Complete all other sampling and analysis activities in accordance with the [UFP-QAPP][basewide QAPP][\_\_\_\_\_] (including but not limited to sample handling, preservation, transportation, [collection][analysis] of quality control samples, data validation, and data reporting). Any deviations to

sampling frequency, number of samples, or sample collection methods must be established in the approved [UFP-QAPP][basewide QAPP][approved by the Contracting Officer].

TABLE 7 - SOIL WASHING OPERATION TESTING FREQUENCIES	
SOIL STREAM	TESTING FREQUENCY Metric Tons Tons
Contaminated Feed Soil	1 per [100][_____]
Treated Soil	1 per [100][_____]
Process Sludge	1 per [100][_____]
Feed Oversize Material	1 per [100][_____]
Treated Washwater	1 per [_____] liters gallons

### 3.6.1.2 Reprocessing and Retesting

\*\*\*\*\*

**NOTE:** An option is provided for retesting soils which fail to meet performance requirements. Retesting without first reprocessing treated soils should generally not be allowed unless there is reason to believe the original test result was inaccurate due to mislabeling/mishandling of the sample or analytical error discovered during validation of laboratory results (simply believing that a grab sample did not reflect the treatment is not sufficient to consider a result inaccurate). Retesting should also generally not be allowed if samples are being used for waste characterization and disposal. This is because waste characterization and disposal is based on grab or composite sampling results, and averaging of sampling results cannot be used to determine that a waste meets regulatory disposal requirements.

\*\*\*\*\*

Reprocess and then retest any unit of treated soils that does not meet the post-treatment criteria in paragraph PERFORMANCE REQUIREMENTS [or quality assurance] testing.[ The Contractor may propose to retest any failing unit of treated soils prior to reprocessing. If the Contracting Officer approves retesting, collect and test two additional samples for the failed parameter(s). If both tests pass, re-processing of the soils will not be required. If either sample fails, a coarser-grained soils unit should re-processed while a finer-grained soil unit should be staged for off-site disposal. The Contracting Officer should be consulted regarding the final disposition of any soils unit that does not meet the post-treatment criteria.]



### 3.6.1.3 Government Quality Assurance Testing

\*\*\*\*\*

NOTE: Consider the need for quality assurance testing on a project-by-project basis. If QA testing is unnecessary, delete this Paragraph. Factors to consider include whether the Government has access to a laboratory that can analyze quality assurance samples in a timely manner to not delay the project execution. Use of quality assurance testing data use also needs to be considered. A relatively straightforward data use is to compare quality assurance sample results to the project Performance Requirements, and failing result would be treated the same way as a failing Contractor test result. A more complicated data use is to compare results from quality assurance samples and contractor quality control samples for the purpose of determining if there is meaningful disagreement between the results. In this case, procedures would need to be developed for determining when there is a meaningful disagreement between quality assurance and quality control sample results; corrective actions for when a meaningful disagreement was identified would also need to be developed. The process of defining procedures for identifying and correcting meaningful differences should be documented in a project-specific Quality Assurance Project Plan and referenced in this specification; the process is likely to complex to be adequately defined in this specification.

\*\*\*\*\*

Provide duplicate samples to the Government's quality assurance laboratory for Government quality assurance. Submit samples at a frequency of one set of samples per [10][\_\_\_\_\_] sets of quality control tests performed. Quality assurance samples will be tested for the same parameters as the parent quality control sample. Provide additional quality assurance samples upon request.

### 3.6.2 Inspections

#### 3.6.2.1 Operations Reports

Submit operations reports [daily][weekly] for the first [10][\_\_\_\_\_] weeks, and at a frequency of [\_\_\_\_\_] thereafter. The operations reports must consist of a log of operating conditions including, but not limited to: hours of operation; staffing; weather conditions; noise, dust, and emissions monitoring data; process soils tracking schedule; sample shipment; receipt of analytical results; changes in operating parameters; results of the testing and calibration activities; and inspection and maintenance activities. In addition, attach the physical and chemical test results generated on-site or received from offsite laboratories to the report.

#### 3.6.2.2 Government Inspection

The Government may conduct inspection of the system installation and perform periodic inspections during the plant operation to verify that the

project activities are performed in accordance with the approved plans, specifications, and the regulatory requirements. Address and resolve inspection findings immediately to the Government's satisfaction.

### 3.7 DEMOBILIZATION

\*\*\*\*\*

NOTE: If there is a separate specification section which provides overall requirements for demobilization/site cleanup, such as 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS, move the requirements from this paragraph into that section.

\*\*\*\*\*

Demobilize to restore the site to its initial state, prior to the construction and operation of the soil washing treatment facilities. Do not commence demobilization until written approval is received from the Contracting Officer. Demobilization must begin only after the contaminated soils, spent washwater, and solid wastes have been treated and disposed of in accordance with paragraph MATERIAL MANAGEMENT. Follow the approved mobilization and demobilization plan prepared as part of the Soil Washing Work Plan. Demobilization must include, but must not be limited to: [disconnecting of utility service lines,][ decontamination and removal of equipment and materials,][ disposal of decontamination wastes,][ disposal of any residual washwater,][ removal of unused amendments and other materials,][ removal of soil overlying liners,][ removal of liners,][ regrading and removal of berms,][ demolition and disposal of the treatment pad, other foundation slabs, and paved surfaces,][\_\_\_\_\_]. [ Perform post-treatment testing of soils below stockpile storage units and work area surfaces in accordance with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.]

-- End of Section --