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USACE / NAVFAC / AFCEC / NASA	**UFGS-02 54 23 (February 2010)** **Change 1 - 08/17**

Preparing Activity: USACE	**Superseding** **UFGS-02 54 23 (April 2006)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021

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SECTION 02 54 23

SOIL WASHING THROUGH SEPARATION/SOLUBILIZATION
02/10, CHG 1: 08/17

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NOTE: This guide specification covers the requirements for removal of heavy metals/inorganics, organics, and radioactive wastes by water-based 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.

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. The maximum allowable quantity of the treated materials or the process sludge from which one

composite sample must be taken for characterization and/or compliance should also be verified. This maximum allowable quantity per composite sample collection may effect the size of a stockpile, and subsequently, determine the number of days required to reach this quantity based on the daily generation of the treated materials or the process sludge.

The soil washing operation considered in this section starts with the raw contaminated material piles; continues through preparation, feeding, washing, separation, stockpiling, waste (solid, liquid and/or gaseous) treatment and disposal; ends at the treated clean material piles. Refer to Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for requirements related to excavation of the contaminated materials and redeposition (or backfilling) of the treated clean materials. Refer to Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS for requirements relevant to offsite transportation and disposal.

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:

Toxicity Characteristic Leaching Procedure (TCLP)

Recording and Reporting Occupational Injuries and Illnesses

Occupational Safety and Health Standards

Safety and Health Regulations for Construction

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

Standards for Protection Against Radiation

Land Disposal of Low-Level Radioactive Waste

Packaging and Transportation of Radioactive Materials

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1.1 MEASUREMENT AND PAYMENT

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NOTE: 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 the field demonstration testing. This paragraph should be deleted if the work is in one lump sum contract or there is a separate Measurement and Payment Section.

****

1.1.1 Measurement

****

NOTE: Materials (such as soil, sediment, and sludge) at a given site should be classified as contaminated materials when levels of the organic, inorganic, and radioactive contaminants in the contaminated materials exceed the site action level criteria which have been established based on regulatory requirements and/or site-specific risk assessment to protect human health and the environment.

****

The feed oversize and the feed materials must be weighed separately during operation of the soil washing treatment plant (the treatment plant). The feed oversize (or debris) consists of the oversized materials separated from the raw contaminated materials by the soil preparation and feed system. The feed materials are the balance of the raw contaminated materials after the feed oversize has been removed. [A properly calibrated platform weigh scale] [_____] and/or [conveyor belt weigh scale] [_____] must be used to accurately measure the gross (bulk) weights in [metric ton short ton] [_____] of the feed oversize and the feed materials, respectively. The measured gross (bulk) weight of the feed materials to be treated by soil washing must be converted to dry weight based on the [percent moisture content] [_____] of representative feed material samples. [The percent moisture content must be determined in accordance with ASTM D2216] [ASTM D4643] [_____]. [Moisture content must be determined [daily.] [for every [500] [_____] [metric ton short ton] of feed material.]]

1.1.2 Payment

Compensation for performing [treatability studies] [_____], demonstration

testing, treatment and/or disposal of the feed oversize, soil washing treatment of feed materials, and other base bid project activities will be provided as specified in the following subparagraphs.

1.1.2.1 Treatability Studies

****
NOTE: Delete this paragraph if treatability studies have already been performed. In that case, the Contractor has the option to perform additional treatability studies at Contractor's expense.
****

Payment for treatability studies will be [included as part of base bid items] [based on lump sum price] [_____]. The price will include costs for labor and materials for: preparing plans; collecting representative contaminated materials; conducting the studies (including sampling and analysis); evaluating results; preparing the treatability study report; and treating and/or disposing of study-derived wastes.

1.1.2.2 Demonstration Test Run

Payment for field demonstration test runs will be [included as part of base bid items] [based on lump sum price for each test run requested by the Contracting Officer and properly completed]. The price will include costs for labor and materials for: [hauling] [_____], stockpiling, processing and treatment, testing and analyzing, report preparation, treatment and/or disposal of wastes (solid, liquid and/or gaseous) generated during test runs, and other incidental work (such as, manufacturers' field services, health and safety monitoring and controls, and utilities). The demonstration test runs must be performed at full scale throughout as specified in this section.

1.1.2.3 Feed Oversize Materials Treatment and/or Disposal

The feed oversize materials must include, but not be limited to, contaminated materials, roots, tree trunks, construction debris, etc., greater than [50 mm 2 inches] [_____] in size. Payment for treatment and disposal of feed oversize material must be based on the contract unit price schedule for each [metric ton short ton] [_____] on a gross (bulk) weight basis of the previously untreated feed oversize material. The unit price must include costs for labor, disposal, and [materials] [stockpiling] [transporting] [treatment] [other incidental work] [_____].

1.1.2.4 Feed Materials Treatment

Payment for soil washing treatment of the feed materials will be based on the contract unit price schedule for each [metric ton short ton] [_____] on a dry weight basis of the previously untreated feed materials entering the treatment plant following removal of feed oversize material. This unit price will include costs for materials, labor, [hauling] [_____], stockpiling, processing and treatment, testing and analyzing, operation and maintenance, and wastes (solid, liquid and/or gaseous) treatment and/or disposal.

1.1.2.5 Other Work Items

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 materials. The other work items include submittals related to operation of the treatment plant, soil washing mobilization and demobilization, site preparation in the treatment plant area, 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 operation if approved by the Government as necessary for the project.

1.1.3 Excess Quantity

****
NOTE: This paragraph should be coordinated with design drawings and paragraphs above for consistency.
****

The payment for the excess quantity must be based on the contract excess quantity unit price schedule for each additional [metric ton short ton] [_____] of previously untreated feed oversize material (on a gross weight basis) and feed materials following separation of feed oversize materials (on a dry weight basis) entering the treatment plant.

1.1.4 Reprocessing

The Contractor will not be paid for reprocessing the contaminated materials not meeting the post treatment criteria outlined in this section. Contaminated materials requiring reprocessing must be identified and deducted from the daily production quantity.

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

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 540/2-91/020A	(1991) Guide for Conducting Treatability Studies under CERCLA: Soil Washing: Interim Guidance
EPA 540/R-92/071a	(1992) A Guide For Conducting Treatability Studies Under CERCLA, Final Report

1.3 SYSTEM DESCRIPTION

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NOTE: If pretreatment such as blending for a homogenous feed or separating contaminated materials 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 MATERIAL so the pretreatment required can be properly specified in this specification without any duplication. In addition, representative samples of the contaminated materials excavated and stockpiled should be collected and analyzed regularly to check and document the physical and chemical characteristics of the contaminated materials. These sampling and analysis efforts should also be specified in the section dealing with excavation and stockpiling.

For remediation using soil washing, a Request for Proposal (RFP) rather than Invitation for Bid (IFB) procurement process is generally used to select a Contractor.

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1.3.1 Soil Washing Treatment Process

Washwater must consist of water only or water plus approved reagents/additives such as acids, bases, surface active agents (surfactants), solvents, and chelating or sequestering agents, to enhance the solubilization and/or separation of the contaminants and thus increase the efficiency of the soil washing treatment.

1.3.2 Soil Washing Treatment Plant

The treatment plant must be configured based on the contaminated material characteristics data, [the Contractor's own interpretation of the previously conducted treatability study results] [_____], and [the bench-scale and/or pilot-scale treatability studies performed by the Contractor] [_____]. The treatment plant [must be transportable. 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 reagents/additives 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 for which specific requirements are provided in this section, 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 Work Plan] [_____]. Provide a safe and reliable soil washing treatment plant in compliance with the applicable codes, regulations, and specified requirements; submit Permits and Certifications as specified. The treatment plant must consist of the following major systems:

1.3.2.1 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 materials (if needed), stockpiling of feed oversize and feed materials, conveying, feeding, treatment and/or disposal of feed oversize, dust/emission controls, and measurement of feed oversize and feed materials. The capacity of this system must be sized based on the downstream treatment system operations.

1.3.2.2 Soil Washing and Separation System

Soil washing and separation system must include mixing, washing, [solids and liquid separation] [particle size separation] [_____], dewatering, stockpiling of treated materials, and measurement of process parameters and treated materials. Treated materials are the feed materials having been washed and separated by the soil washing and separation system. Treated clean materials are the treated materials which meet the post treatment criteria. The system must be equipped with direct means for controlling the washwater settings including [pH] [temperature] [pressure] [composition] [quantity] [contact time] and [cut size] [_____]. The mixing and washing equipment must have the capability to dissociate the contaminated fine particles from the coarse particles and/or to solubilize the contaminants into the washwater so that the post treatment criteria can be achieved. [Magnetic separation of ferrous material must be done using electromagnets.] The dewatering equipment must have the capability of lowering the moisture content to less than [10] [15] [_____] percent as required for the backfilling operation. The treated materials must be separately stockpiled on a [daily] [_____] basis [according to the sampling and testing requirements] [_____].

1.3.2.3 Spent Washwater Treatment System

Spent washwater is washwater that has been in contact with contaminated feed materials or other contaminated surfaces, consisting of a mixture of contaminated fine particles and/or dissolved contaminants, washwater, and run off water from storage and treatment areas. Spent washwater treatment system (if required) must 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; stockpiling, treatment and/or disposal of process sludge; 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 fine particles in the spent washwater. 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.

1.3.2.4 Plant Supporting System

The plant supporting system must include facilities for water storage and distribution, reagents/additives storage and distribution, [power and steam] [power] generation and distribution, and fire safety. These supporting facilities must have adequate capacities to provide water, reagents/additives, 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] [_____]. Reagents/Additives used in the treatment plant must be stored in tanks, drums or other containers which are made of compatible materials. The feeding equipment for each reagent/additive must consist of a feed tank and mixer for preparing feed stock, and a metering pump for controlled feeding.

1.3.3 Performance Requirements

****

NOTE: Table 1 should be developed based on site-specific contaminants of concern and regulatory requirements.

Planned 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 (SPLP), Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs), and RCRA delisting requirements. Coordinate backfilling with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL to ensure geotechnical parameters are specified.

****

A treatment plant capable of processing contaminated materials at [an average expected rate factoring in downtime, startup time, and shutdown time] [a designed rate based on adjusted dry weight] of [[_____] metric short tons per hour] [_____] must be provided. The concentrations of the contaminants in the treated material and in the TCLP extract of the treated material must not exceed, respectively, the cleanup level and TCLP extract limit specified in Table 1.

TABLE 1 - POST TREATMENT CRITERIA		
	CLEANUP LEVEL IN TREATED MATERIAL	
PARAMETER	TOTAL CONCENTRATION IN TREATED MATERIAL	TCLP EXTRACT LIMIT
Arsenic	[_____] mg/kg	[_____] mg/L

TABLE 1 - POST TREATMENT CRITERIA		
	CLEANUP LEVEL IN TREATED MATERIAL	
PARAMETER	TOTAL CONCENTRATION IN TREATED MATERIAL	TCLP EXTRACT LIMIT
Cadmium	[_____] mg/kg	[_____] mg/L
Chromium	[_____] mg/kg	[_____] mg/L
Lead	[_____] mg/kg	[_____] mg/L
Pentachlorophenol	[_____] mg/kg	[_____] mg/L
1,4-Dichlorobenzene	[_____] mg/kg	[_____] mg/L
PCBs	[_____] mg/kg	
Radium	[_____] pCi/g	

1.3.4 Cut Size Requirement

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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 in this paragraph.

****

Cut size is the targeted grain size used to define the demarcation of the coarse and fine fractions of the feed materials to be separated during the soil washing operation. [The feed materials must be treated to meet the post treatment criteria by using a cut size of no greater than [_____] micron in the soil washing treatment.] [Each cut size must be based on the treatability study results so that the treated materials will meet the post treatment criteria with minimum generation of process sludge. 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.]

1.3.5 Installation Requirements

The treatment plant must be installed 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, the Contracting Officer must be informed and consulted for interpretation.

1.3.6 Results of Previously Conducted Treatability Studies

****

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

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 materials, 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, additional studies must be performed 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 the Contractor's own studies and results], provide a full scale treatment plant which meets the requirements identified in this section.

1.3.7 Utilities

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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.

****

Provide the utilities associated with the installation and operation of the treatment plant including, but not limited to: telephone, electricity, water,[steam,] [gas,] [_____], sanitary, and solid waste facilities. The [telephone] [electricity] [steam] [water] [gas] [sanitary] and [solid waste facilities] [_____] are available at the site. [Refer to the drawings for hookup locations and other details.]

1.3.8 Spent Washwater Treatment and Disposal Requirements

****

NOTE: These paragraphs provide the generic requirements for wastewater 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 or treated 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 2 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.

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 LDRs. In addition, the requirements in RCRA Standards for Generators of Hazardous Waste and applicable state regulations should be identified and satisfied.

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

****

Characterize the spent washwater. The spent washwater must be recycled and/or treated for reuse whenever possible, to minimize the amount of wastewater requiring treatment and disposal. The spent washwater must meet the criteria presented in Table 2 at the time of [disposal] [discharge]. Modify Table 2 [in the proposal][and][_____] in the Work Plan to address additional requirements such as changes to spent washwater characteristics requiring additional treatment or a change in the [disposal] [discharge] criteria.

TABLE 2 - SPENT WASHWATER DISPOSAL/DISCHARGE CRITERIA	
PARAMETER	DISPOSAL/DISCHARGE CRITERIA
Arsenic	[_____] mg/L
Cadmium	[_____] mg/L
Chromium	[_____] mg/L
Lead	[_____] mg/L
Pentachlorophenol	[_____] mg/L
1,4-Dichlorobenzene	[_____] mg/L
PCBs	[_____] mg/L
Radium	[_____] pCi/L

1.3.9 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 material.

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 3 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 entitled Emissions and Dust Control Requirements.

****

The solid wastes must be characterized. The [feed oversize removed from the raw contaminated materials] [process sludge generated from treatment of spent washwater] and [spent process treatment material] [_____] from installation, operation and closure of the treatment plant must be properly treated and/or disposed of. 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. Solid waste disposal must meet the criteria presented on Table 3. Propose modifications to Table 3 to address solid wastes generated by the soil washing treatment plant with characteristics which necessitates additional treatment, and/or disposal requirements be attained. These additional requirements must be addressed [in the proposal][and][_____] in the Work Plan.

TABLE 3 - SOLID WASTE DISPOSAL CRITERIA		
	DISPOSAL CRITERIA	
PARAMETER	CONCENTRATION LEVEL IN TREATED SOLID WASTE	TCLP EXTRACT LIMIT
Arsenic	[_____] mg/kg	[_____] mg/L
Cadmium	[_____] mg/kg	[_____] mg/L
Chromium	[_____] mg/kg	[_____] mg/L
Lead	[_____] mg/kg	[_____] mg/L
Pentachlorophenol	[_____] mg/kg	[_____] mg/L
1,4-Dichlorobenzene	[_____] mg/kg	[_____] mg/L
PCBs	[_____] mg/kg	
Radium	[_____] pCi/g	

1.3.10 Emissions and Dust Control

****

NOTE: An air pathways analysis should be performed during design in accordance with EP 1110-1-21 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 materials, 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.

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

If a performance specification is prepared, the emissions, dust sources, and contaminants of concern should meet specified requirements based on applicable regulations. Table 4 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.
****

Characterize the emissions and dust sources. The emissions must meet the criteria presented in Table 4. The monitoring requirements for emissions and dust control must be developed in accordance with the environmental compliance required by the regulatory agencies and the health and safety requirements. They must be implemented during the installation and operation of the treatment plant to ensure compliance. Modify Table 4 [in the proposal] [and] [_____] in the Work Plan to address treatment plant emissions sources, dust sources, and control technologies, which differ from those presented in Table 4.

TABLE 4 - AIR EMISSIONS CRITERIA	
PARAMETER	**EMISSIONS CRITERIA**
[_____]	[_____]

1.3.11 Noise Control

****
NOTE: 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.
****

The treatment plant must meet the state and local noise pollution control regulations. The monitoring requirements for noise control must be developed in accordance with the environmental compliance required by the regulatory agencies. Implement noise control requirements during the installation, operation, and closure of the treatment plant.

1.3.12 Sampling, Monitoring, and Control Requirements

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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.

****

The treatment plant must have the appropriate sampling and monitoring equipment for controlling the performance of the treatment processes and for complying with design and regulatory requirements. The monitoring and control equipment for the treatment processes must have the necessary accuracy and sensitivity to measure and control the operating ranges for system parameters such as [materials 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. A main control center must be provided to facilitate the overall control of the treatment plant. The signal transmission to and from the main control center must be [4-20 mA] [_____]. The process and waste generation data must be maintained in the main control center and recorded on [magnetic tapes] [discs] or [_____].

1.3.13 Contaminated Material Measurement Accuracy Requirements

Scales, meters, and volumetric measuring devices for measuring feed oversize, feed materials, reagents, and water must have an accuracy of plus or minus [0.5] [_____] percent of the quantity being measured. Scales must be calibrated at least once every 5 working days.

1.3.14 Mobilization

The treatment plant must not mobilize to the site until the Work Plan has been approved by the Contracting Officer and the Contractor has received written confirmation. The Contractor's mobilization plan must include, but not be limited to, preparation, arranging, and/or transportation of personnel, material, and equipment; and connecting supporting utilities for installation and operation of the treatment plant. Delays caused by the Contractor's failure to meet regulatory requirements must result in no additional cost to the Government. 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.

1.3.15 Demobilization

Demobilization must begin only after the contaminated materials, spent washwater, and solid wastes have been treated and disposed of in accordance with the post treatment criteria listed in Table 1, the disposal/discharge criteria in Table 2, and the disposal criteria in Table 3, respectively. Demobilization must include disconnecting and removal of utility service lines, decontamination of equipment and the treatment plant area, disposal of decontamination wastes, disposal of spent washwater left from operation of the treatment plant, removal of the unused reagents/additives and the equipment associated with the treatment plant, and [demolition and disposal of foundation slab] [_____]. [Post treatment testing must also be performed after demobilization to verify that the area associated with soil washing treatment operations is not

contaminated. The soils in the area must meet the post treatment criteria listed in Table 1] [_____].

1.3.16 Submittal Requirements

Submit a Work Plan within [45] [_____] days after notice to proceed. Allow [30] [_____] days in the schedule for Government review and approval of the Work Plan. The Work Plan must address the technical requirements listed in this section and must include, but is not limited to, the following:

a. Schedule. The schedule must specify dates for the start and completion of [treatability studies] [_____], mobilization, installation, field demonstrations, treatment of contaminated materials, disposal of wastes, and demobilization. The schedule must include details such as intended hours of operation, scheduled downtime, and routine maintenance downtime.

b. Project Organization. A project organization must be proposed for carrying out the remediation of contaminated materials by soil washing treatment. An organization chart including subContractors must be provided. The responsibilities of each individual in the organization must be clearly defined 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. In addition, the previous experience of each individual in the project organization must also be submitted for review and approval. Credentials of new operators, quality control personnel, and supervisory engineering and technical staff must be furnished to the Contracting Officer for approval [5] [_____] working days prior to such personnel assuming duties onsite.

c. Treatability Study Work Plan. The Treatability Study Work Plan must outline the planned testing and evaluation. This study must include, but not be limited to: contaminated materials characterization (including the contaminant concentration as a function of grain size if a cut size needs to be determined), washwater determination and optimization, residuals management, mass balance calculation, unit processes/operations evaluation, cut size determination for separation (if applicable), treated materials characterization, sampling locations, analytes, testing protocols, and waste streams characterization. In addition, the Treatability Study 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 reagents/additives are to be used in the processes, Safety Data Sheets (SDS's) and other non-proprietary type information of the reagents/additives must be provided to assess their potential for secondary contamination during the installation and operation of the treatment plant.

d. Principles of Operation. A detailed description of the proposed treatment plant must be provided. The description must include treatment systems and corresponding unit operations, treatment capacity, preparation of feed material, soil handling and feed systems, quality of washwater, properties and handling of reagents/additives, mechanism of contaminant removal, characteristics and stockpiling of the treated materials, and wastes generation and disposal. Post treatment criteria, [disposal criteria] [discharge

criteria] and [air emissions criteria] [_____] must be presented based on the proposed treatment plant and the site conditions.

e. Equipment. Treatment system equipment must be described completely. The description must include, but not be limited to, equipment identification, manufacture make and model, physical size, operating conditions, and materials of construction.

f. Drawings. The drawings provided must include, but not be limited to: layout of the treatment plant including feed material stockpiles, including a drainage and leachate collection plan for the area, treated material stockpiles, and solid waste stockpiles; piping and instrumentation diagrams; and process flow diagrams.

g. Quality Control. A site-specific quality control program must be provided 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.

h. Process Material Tracking Schedule. A proposed Process Material Tracking Schedule for recording and managing the quantities of the contaminated materials 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 materials that fail to meet post treatment criteria] [_____], and the treated clean materials to be backfilled.

i. Mobilization and Demobilization. A mobilization and demobilization plan must be included.

j. Field Demonstration Plan. Outline the planned demonstration and evaluation activities. This plan must address, but not be limited to, contaminated materials characterization (including the contaminant concentration as a function of grain size if a cut size needs to be determined), proposed demonstration testing runs (including specification of washwater mix design and testing/operating conditions of the unit processes/operations for each run), sampling locations, analyses, and analytical methods, mass balance calculation and performance evaluation [for each major piece of equipment], cut size determination for separation (if applicable), treated materials and waste characterization, health and safety monitoring and control, and waste treatment and/or disposal. If proprietary reagents/additives are to be used in the processes, SDS's and other non-proprietary type information of the reagents/additives must be provided to assess their potential for secondary contamination during the demonstration testing. In addition, the day-to-day log of operations and adjustments to optimize the treatment system must be included in the appendices.

k. Site-specific Noise Control and Monitoring Plan. For environmental compliance,this plan must include, but not be limited to, expected noise level, sources of noise, proposed noise control, and types and locations of monitoring devices.

l. Site-specific Emissions and Dust Control Monitoring Plan. For environmental compliance and process control,this plan must include,

but not be limited to, expected quantity of emissions, sources of emissions, proposed emissions control. If an air pathway analysis indicates monitoring is required, backup calculations, and regulatory information substantiating decisions proposed must be provided in addition to types and locations of monitoring devices.

m. Treatability Study Report 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.

1.3.17 Other Submittal Requirements

Permits, certifications, and/or substantive regulatory requirements necessary for the configuration, installation, operation, and closure of the treatment plant. The required permits, certifications, and/or substantive regulatory requirements must be provided along with the Work Plan. For those permits, certifications, and/or substantive regulatory requirements which have not been obtained, a copy of these applications must accompany the Work Plan. The following must also be submitted:

a. During the soil washing treatment operation, the physical and chemical test results of the [contaminated materials] [_____], treated materials, and wastes, background sampling under stockpiles and the plant area prior to construction activities, and following removal of the soil washing equipment and stockpile areas. The test results must include time of sampling, location of sampling, and Contractor Quality Control (such as duplicate sample analysis, field and trip blank analysis, laboratory QC analysis, etc.) results. Data validation of the test results must be performed before submittal. The sample collection, packaging, shipping, analyses, and reporting must be conducted in accordance with Section 01 45 00.00 10 QUALITY CONTROL Section 01 45 00.00 20 QUALITY CONTROLSection 01 45 00.00 40 QUALITY CONTROL.

b. Reports of daily tests and operations; Certificates of analyses for reagent and additives; and analytical results of the water analysis to verify purity before use.

1.4 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, Air Force, and NASA 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.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

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.][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-03 Product Data

Soil Washing Work Plan; G[, [_____]]
Field Demonstration
Noise Control
Emissions and Dust Control
Permits and Certifications

SD-06 Test Reports

Treatability Study Report
Field Demonstration Report; G[, [_____]]
Water Supply Analysis
Daily Operations Report
Physical and Chemical Test Results

SD-07 Certificates

Reagent/Additive Certificates of Analyses

1.5 QUALIFICATIONS

****

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.

****

Demonstrate capabilities and experience adequate to configure, install, and operate a soil washing treatment plant to remediate the contaminated

materials. Demonstrate a minimum of [3] [_____] years of experience in the field of soil washing and/or the successful completion of [at least [1] [_____] soil washing project of comparable size and scope] [at least [3] [_____] 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 material] [_____]]. Provide a field team (consisting of soil washing unit operators, quality control personnel, health and safety personnel, supervisory engineering, and technical staff) qualified to install and operate the treatment plant.

1.6 DELIVERY, STORAGE, AND HANDLING

The equipment, raw materials (including reagents/additives), contaminated materials, and treated materials must be safely transported, stored, and handled. Packaging and shipping of these items must be in compliance with United States Department of Transportation (USDOT) requirements. Storage and handling of these items onsite must be in accordance with the manufacturer's recommendations and in compliance with applicable regulatory requirements.

1.7 SITE CONDITIONS

****

NOTE: The pertinent site characterization data should be placed in the appendices of the technical specifications or on the drawings, and referenced here. If the site contains a significant amount of debris (feed oversize), 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 site investigation data presented is representative of surface and subsurface conditions at a specific location; variations in the contaminated materials could occur.

1.7.1 Environmental Requirements

****

NOTE: When temperature is below the freezing point, the treatment plant equipment may not function properly or efficiently. Frozen materials 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 the 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. Use of UFGS should address only the minimal requirements to satisfy the

temporary construction.
****

The treatment plant must not be operated during periods when temperatures reach freezing or below [unless operated in a structure]. Do no perform soil washing during periods of heavy rainfall if this will interfere with the effective operation 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. The treatment plant must be equipped with sufficient lighting for security purposes and for treatment plant operation during inadequate daylight or at night. [Refer to Section 23 30 00 HVAC AIR DISTRIBUTION for proper heating, ventilation, air conditioning, and Section 26 56 00 EXTERIOR LIGHTING for illumination.]

1.7.2 Existing Conditions

****
NOTE: The information presented in Table 5 and in the Appendix should also include other information such as chemical data, geotechnical data, sampling locations, and boring logs. The information presented in Table 5 can be presented either in tabular form or on the drawings.
****

The existing site conditions are presented [in Appendix [_____]] [on the drawings]. These include [physical configuration] [topography] [land uses] [geotechnical characteristics of the contaminated materials (including [grain size analysis] [total organic content] [cation exchange capacity] [pH] [moisture content] [density] [porosity]) [hydrogeology]] and [nature and extent of contamination] [_____]. The contaminants of concern and the estimated volume of contaminated materials are given in [Table 5] [_____]:

TABLE 5 - NATURE AND EXTENT OF CONTAMINATION				
CONTAMINATED ZONE	CONTAMINATED MATERIALS			CONTAMINANTS OF CONCERN
	AREA	AVERAGE DEPTH	VOLUME	
Zone 1	[_____]	[_____]	[_____]	[_____]
Zone 2	[_____]	[_____]	[_____]	[_____]
Zone n	[_____]	[_____]	[_____]	[_____]
1. Contaminated zones are defined on the Drawings [_____].				
2. Area in square m yd.				
3. Depth in m ft.				
4. Volume in cubic m yard.				

Perform an independent interpretation of the data/results. The data/results must include contaminant concentrations, [grain size analysis of the contaminated materials] [contaminant concentrations in each grain size fraction] [sample depth and location],[_____], and other contaminated material characteristics presented in the specification. Based on their

own interpretation of the data/results, determine their treatment plant configuration. Discrepancies between the data presented and field conditions discovered during the initial trial/startup period must be brought to the Contracting Officer's attention immediately.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Water Supply

Water must not contain oils, acids, salts, alkalis, organic matter, solids or other substances that could be detrimental to the successful treatment of the contaminated materials; submit a Water Supply Analysis as specified.

2.1.2 Reagent/Additive 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 parameters for each reagent/additive to be provided must include, but are not limited to, chemical formula, grade/purity, form, strength, and typical supplier. The residuals of these reagents/additives in the treated materials or the solid, liquid and gaseous wastes from the treatment plant must not cause secondary contamination to the environment. A certificate of analysis for each of the reagents/additives must be supplied by the vendor and must accompany each shipment. Reagents/additives must be shipped in properly labeled containers with instructions for handling and storage.

2.2 MIXES

The composition of washwater and the quantity ratios of washwater to feed materials must be determined for the mixing and washing operations to achieve the required treatment results.

2.3 SAMPLES FOR TREATABILITY STUDIES

****

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.

****

[The Contracting Officer will provide the required samples to conduct the treatability studies.] [Select sampling locations and collect representative samples to conduct the treatability studies. The existing site conditions presented in paragraph Existing Conditions must be considered for selecting sampling locations. The collected treatability study samples must have contaminant concentration levels [representative of the average concentration of the contaminants identified] [and]

[greater] [than the action level criteria presented] in Table 6. Otherwise, sampling must be repeated until the contaminant concentration levels exceed the action level criteria. Coordinate the sampling protocol with the Contracting Officer before obtaining the samples.] Treatability studies must not commence until soil samples meet the aforementioned concentration criteria. The treatability studies must be conducted in accordance with EPA 540/2-91/020A and EPA 540/R-92/071a.

TABLE 6 - ACTION LEVEL CRITERIA	
PARAMETER	ACTION LEVEL CRITERIA
Arsenic	[_____] mg/kg
Cadmium	[_____] mg/kg
Chromium	[_____] mg/kg
Lead	[_____] mg/kg
Pentachlorophenol	[_____] mg/kg
1,4-Dichlorobenzene	[_____] mg/kg
PCBs	[_____] mg/kg
Radium	[_____] pCi/g

2.4 EQUIPMENT

Conduct a pre-installation examination of the treatment plant equipment for any damage, defect, and dilapidation. The results of the pre-installation examination must be documented and submitted to the Contracting Officer for review and information. Upon completion of the treatment plant installation, a pre-operational test of the equipment and controls must be performed under operating conditions using clean water to check for leaks and continuity. The Contracting Officer will 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. The equipment must be properly and routinely inspected and maintained to provide the operation of the treatment plant as required by the contract schedule. Any schedule delay and cost associated with power failure, line plugging, improper functioning of equipment and controls, unavailability of labor and materials, etc., must be the responsibility of the Contractor. The Contractor is also responsible for providing alternate/auxiliary power source if sufficiently reliable source is not available.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Stockpiles of Contaminated Materials

****

NOTE: Background sampling under the stockpiles of contaminated materials should be performed before their construction, unless previous information is adequate. Coordinate with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.
****

The clearing and grubbing as well as excavation must be performed in accordance with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL. Stockpile storage areas for feed oversize, feed materials, treated materials, process sludge and [_____] must be constructed. [One] [_____] composite surface background sample must be taken from the stockpile areas prior to their construction to document the level of contamination present at the onset of construction [_____]. Contamination under stockpile areas resulting from remedial action activities must be cleaned up to [action] [background] levels at the Contractor's expense. The following minimum requirements must be incorporated in the stockpile design:

3.1.1.1 Liner

****
NOTE: The liner is not always necessary and should be deleted if not required. If the liner is required, then reference separate section to address installation and construction of the liner.
****

Use a [geomembrane] [_____] liner under the stockpiles to prevent the release of contaminated leachate to the environment. The construction and installation of the liner must conform to the manufacturer's requirements. The minimum thickness of the liner must be [1 mm 40 mils] [_____]. [Liner must be as specified in Section 33 47 13 POND AND RESERVOIR LINERS.]

3.1.1.2 Cover

****
NOTE: This paragraph will be included if an impermeable synthetic cover is considered necessary.
****

Use a [geomembrane] [_____] (reinforced ultra-violet stabilized polyethylene) cover to prevent precipitation from entering a stockpile and volatile emissions and dust from escaping. [Do not use the cover during active plant operation.] Employ control measures such as wetting the stockpile surfaces to suppress dust. The minimum thickness of the cover must be [0.25 mm 10 mils] [_____].

3.1.1.3 Diversion Measures

Berms, a minimum of [[300] [_____] mm [12] [_____] inches] in height and/or other suitable diversion measures (such as drainage swale) must be constructed around the stockpiles to prevent run on and run off.

3.1.1.4 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 a 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. For discharge or offsite disposal, the applicable Federal, state, and local regulatory requirements must be met.

3.1.2 Foundations

****
NOTE: Minimum requirements should be specified for the foundation/containment area of the treatment plant. Depending upon the duration of soil washing treatment, the weight support requirement of the plant, rainfall and equipment washdown water collection requirements, the foundation to be employed can range from a simple foundation consisting of synthetic liner, sand, and/or gravel, to a concrete slab. For a long term project, large project, or a project handling multiple soil fractions, a concrete or asphalt pad should be provided for the treatment plant.
****

Suitable foundations (ranging from a simple foundation consisting of synthetic liner, sand and or gravel, to an asphalt or a concrete slab) must be constructed to support and accommodate the treatment plant. Concrete must be proportioned in accordance with Section 03 30 00 CAST-IN-PLACE CONCRETE. The area around the soil washing equipment must be graded so that the water drains away from the work area adjacent to the treatment area. Water collected must be recycled or properly treated for disposal.

3.2 ERECTION, INSTALLATION, AND DEMOBILIZATION

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

The treatment plant must be erected and installed on a temporary basis and must be removed from the site after completion of the contract work. The erection and installation must be performed such that there is minimal damage to the existing site environment.[The mechanical work must conform to the requirements of Section 23 30 00 HVAC AIR DISTRIBUTION]. The electrical work must conform to the requirements of Sections [33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION] [33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION] [_____], and [Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM]. The plumbing work must conform to the requirements of [Section 22 00 00 PLUMBING, GENERAL PURPOSE] [Section 40 05 13 PIPELINES, LIQUID PROCESS PIPING] [_____].

3.3 OPERATION

3.3.1 Different Types of Contamination and Materials

Different types of contamination, materials, and resulting waste streams must be treated separately if the testing results indicate that different operating conditions of the treatment plant have to be implemented in order to achieve effective treatment of these materials.

3.3.2 Stockpile Management

****

NOTE: Sampling location, contaminant type, and sampling frequency should be presented for each feed type and/or treated material/sludge. A format similar to Tables 1 and 2 should be used. 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 materials, treated materials, and process sludge for incorporation into the related subparagraphs.

****

The different materials generated by the treatment plant must be stockpiled separately as specified below. The wastewater, solid wastes, and dust generated during stockpile management must be handled as specified in Paragraph SYSTEM DESCRIPTION. The stockpiles must be managed so no contaminants or fine particles are released into the environment. Run on and run off water must be controlled in the stockpile areas. The rainfall run off and any leachate material from the stockpile areas must be collected and treated for discharge/disposal or used for make up water in the treatment plant.

3.3.2.1 Feed Oversize

The feed oversize stockpiles must be treated (if required) and disposed of according to their waste classification and accumulated quantities.

3.3.2.2 Feed Material

The feed material stockpiles must be limited to a quantity capable of sustaining [5] [_____] days operation of the treatment plant.

3.3.2.3 Treated Materials

Treated materials must be segregated into units (stockpiles) on a [daily] [_____] basis for post treatment testing. If the test results indicate the treated materials of a stockpile meet the post treatment criteria presented in Table 1, this stockpile of treated materials must be combined with the stockpile of previously treated clean materials awaiting backfilling. Treated materials that do not meet the post treatment criteria in Table 1 must be reprocessed by the treatment plant.

3.3.2.4 Process Sludge

The process sludge stockpiles must be treated (if required) and disposed of in a cost effective manner, according to their waste classification and quantities accumulated.

3.3.3 Auxiliary Requirements for System Operations

All required spare, auxiliary, and support equipment, such as a portable generator to provide emergency power for lighting, controls, and computer system operation [,_____] must be provided.

3.3.4 Management of Reagents/Additives

Sufficient quantities of the required reagents/additives must be stored in the plant area to support the operation of the treatment plant. The reagents/additives must be stored in accordance with manufacturer's instructions and regulatory requirements. The reagent/additive holding times must not be exceeded.

3.3.5 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 materials are significantly different from the originally defined characteristics, and (2) the treatment requirements cannot be met under the current treatment plant mix design and related operating conditions. When change of operating condition is necessary, notify the Contracting Officer before changes are made to the mix design and related operating conditions. The Contracting Officer may require the Contractor to perform a field demonstration for significant changes made to the mix design and related operating conditions in accordance with paragraph DEMONSTRATION, for approval. Changes to mix design and associated time and costs must be accomplished at no additional cost to the Government.

3.3.6 Management of Treatment Plant Wastewater

The wastewater generated by the unit operations of the soil washing

treatment plant must be recycled and/or reused 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 wastewater. If a wastewater treatment system (including the Spent Washwater Treatment System) is provided, it must have the capacity and capability to treat the wastewater (including collected rainfall run offs) for recycle or reuse. Wastewater discharged to the environment, or sent to an offsite treatment facility must comply with the requirements identified in paragraph SPENT WASHWATER TREATMENT AND DISPOSAL REQUIREMENTS.

3.3.7 Daily Operations Report

Submit a daily operations report for review following each day's operation of the treatment plant. The daily operations report 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 materials 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 onsite or received from offsite laboratories to the report.

3.4 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.

****

3.4.1 Post Treatment Testing

****

NOTE: 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 material per composite sample. This will define the size of each stockpile, and the time required to reach this quantity. Coordinate requirements with paragraph STOCKPILE MANAGEMENT.

The feed oversize is generally handled by either onsite decontamination for backfilling or offsite disposal as hazardous wastes. The disposal of spent process treatment material such as activated carbon is generally negotiated as part of the suppliers contract and may not require post treatment testing. Therefore, only treated materials and the

process sludge are addressed in this paragraph. Offsite transportation and disposal of feed oversize, spent process treatment material, and process sludge require manifesting and record keeping for each material shipment.

****

One composite sample must be collected from each stockpile for each [_____] [CM] [CY] of feed material treated and the process sludge generated. One composite sample must be collected for each [_____] [CM] [CY] of oversize material generated. One composite sample must be collected for each [_____] [CM] [CY] of sludge generated. The samples must be sent to the laboratory for analysis via overnight shipment. The laboratory must analyze the samples within [48] [_____] hours. The results of the analysis must be telecopied or telephoned to the Contractor. Report the results to the Contracting Officer within [4] [_____] hours after receipt of the results. The treated material samples must be analyzed for the parameters listed under post treatment criteria in Table 1. The process sludge samples must be analyzed for the parameters specified in Table 3.

3.4.2 Reprocessing

Reprocessing and retesting must be performed on the treated materials that do not meet the post treatment criteria listed in Table 1. The treated material which needs to be reprocessed must be done at no additional cost to the Government. Treated materials that do not meet the post treatment criteria must be [immediately reprocessed and retested] [stored separately while waiting for reprocessing and retesting].

3.4.3 Government Testing

The Contractor's sampling and analysis, as well as quality assurance laboratory requirements must be as indicated [_____].

3.5 GOVERNMENT INSPECTION

The Government will 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. Inspection findings must be addressed immediately and resolved to the Government's satisfaction.

3.6 DEMONSTRATION

3.6.1 Field Demonstration

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NOTE: 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.

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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 [8] [_____] hours per day for at least [2] [_____] days. During the demonstration run, [composites samples] [_____] must be taken every [2] [_____] hours from the feed materials, [feed oversize] [_____], spent washwater, effluent from treatment of spent washwater, treated materials, process sludge, and the other locations necessary to perform mass balance calculations. The samples must be analyzed for the purpose of performing mass balance calculations and to evaluate compliance with regulatory requirements. Allow [10] [_____] working days in the schedule for Government review and approval of the field demonstration report. A field demonstration run must be performed on each distinctive type of material or contaminant which requires a substantial change in treatment plant operating conditions.

3.6.2 Full Scale Processing Equipment

The full scale treatment plant must be utilized for the field demonstration. The operating conditions used during the field demonstration must be the same as those proposed for use during the remediation.

3.6.3 Sampling Locations

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NOTE: Specify each location and depth at which contaminated material samples for the field demonstration will be obtained. A separate table listing minimum concentrations of specific contaminants may be inserted if desired.

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Contaminated materials used for the field demonstration must be obtained [as directed by the Contracting Officer] [_____]. In order to be sure that the contaminated materials are appropriate for use in the field demonstration runs, [1] [_____] initial composite sample for chemical analysis per demonstration run must be performed on the contaminated materials to verify the average contaminant concentration levels are representative of the average contaminant concentrations at the site [and exceed the action level criteria listed in Table 6] [_____]. A composite sample representing the minimum period identified in paragraph FIELD DEMONSTRATION.

3.6.4 Testing

Testing must be performed to verify that the treated materials from the field demonstration meets the post treatment criteria listed in Table 1. If the treated materials produced during the field demonstration do not meet the post treatment criteria, an equal quantity of the same type of material that failed must be reprocessed, using properly modified operating conditions, until satisfactory results are obtained. The treated materials that failed the demonstration testing must be returned to the contaminated materials stockpile for processing during remediation. Testing of the contaminated and the treated materials before

and after demonstration test runs must be performed in accordance with the same testing protocol as proposed for the full scale operation.

3.6.5 Commencement of Full Scale Operation

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NOTE: It is preferable to direct the Contractor to stop processing contaminated materials until results from the field demonstration testing indicate the Contractor's proposed operating conditions can successfully treat the contaminated materials.

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Full scale operations must not be initiated until written approval has been received from the Contracting Officer, and the following submittals have been approved: [soil washing work plan] [field demonstration report] [_____]. [After completion of the field demonstration, the Contractor may continue to process the contaminated materials. However, if test results indicate that treated materials do not meet the post treatment criteria listed in Table 1, the contaminated materials treated with the failed operating conditions must be reprocessed at no additional cost to the Government.]

3.7 PROCESS MATERIALS MANAGEMENT

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NOTE: Table 7 is an example and should be modified based on site-specific conditions and requirements.

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Process materials tracking must be performed during the operation of the treatment plant. The schedules for process materials tracking must provide data and information to identify locations and quantities of materials at any given time. The tracking must be performed on materials including, but not limited to, contaminated materials, feed oversize, feed materials, treated materials, treated clean materials, [_____], and process sludge. Tracking of each material must start from the original source, continue through various stages of handling and treatment, and end at the ultimate disposal. Use Table 7 or other equivalent schedule approved by the Contracting Officer to perform the material tracking during operation. Table 7 must be filled out for each material and each of the locations where this material is stockpiled or temporarily stored, including Stockpile Number. The completed tracking schedules must be submitted to the Contracting Officer as part of the Daily Operations Report.

TABLE 7 - SCHEDULE FOR PROCESS MATERIALS TRACKING DURING SOIL WASHING OPERATION		
MATERIAL: CONTAMINATED SOIL LOCATION: STOCKPILE NO. CS-1		
INPUT		OUTPUT
(QUANTITIES IN METRIC TONSSHORT TONS)		

TABLE 7 - SCHEDULE FOR PROCESS MATERIALS TRACKING DURING SOIL WASHING OPERATION						
DATE/TIME	FROM	QUANTITY	TO	QUANTITY	QUANTITY AT THE LOCATION	REMARKS
4/15/98 8:00 AM	--	0	--	0	0	Excavation starts
10:00 AM	Excavation Area No. 1	5470	--	0	5470	
12:00 Noon	Same	5470	Soil Preparation and Feed System	3850	7090	
2:00 PM	--	0	Same	3850	3240	

-- End of Section --