THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 137

File: 541.460.D
C.G. M. 137

APPENDIX

ANNEX

Jan 96
(Date Estimated)

CHEMICAL WARFARE MATERIAL - SAMPLING / ANALYSIS

ASSOCIATED WITH THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY

AT DEFENSE DEPOT MEMPHIS, TN

STATEMENT OF WORK

1.0 BACKGROUND

1.1 The Defense Depot Memphis, TN (DDMT) is a Defense Logistics Agency (DLA) storage, shipping, and receiving facility located in Memphis, TN. DDMT is a National Priorities List (NPL) site and therefore must comply the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for a NPL site. The DDMT has entered into a Federal Facilities Agreement containing descriptions of requirements, conditions, processes, and schedules for Hazardous and Toxic waste (HTW) remediation work to be performed at the facility.

1.2 As part of the Remedial Investigation/ Feasibility Study (RI/FS) at DDMT, actions are required to ensure appropriate protection for HTW remediation contracter employees and for the surrounding public due to potential exposure to Chemeical Warfare Materials (CWM) and associated breakdown products which may be encountered during field investigations required to assess HTW contaminated areas, remove potential source areas and implement an interim groundwater remedial action, as required by the HTW remediation contract. CWM may be encountered on site due to past decontamination and disposal activities. Additionally, small quantities of Chemical Agent Identification Sets (CAIS) were buried in a disposal action on a portion of the facility. References to specific locations on the facility are derived from the DDMT RI/FS Generic Work Plan (Reference 9.28) and DDMT Archive Search Report (Reference 9.2).

1.3 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program - Formerly Used Defense Sites. Ordnance and Explosive Waste (OEW) contamination exists on property formerly owned by the Department of the Army.

1.4 General. OEW is a safety hazard and constitutes an imminent endangerment to the public. These actions will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). For any actions on site, no Federal, State, or Local permits are required. The provisions of 29 CFR 1910.120 shall apply to all actions taken at this site.

1.5 This site is a suspected Chemical Warfare Material (CWM) site. It is the intent of the Government that the A-E shall not perform intrusive work directly on known anomalies which could be CWM burial sites. However, the A-E may encounter suspected CWM during work. In this case, the A-E shall immediately withdraw from the work area and notify the Corps of Engineers on-site Safety Specialist for guidance. The Huntsville Division Safety Office will notify the Technical Escort Unit (TEU).

2.0 OBJECTIVES. The objective of this delivery order include:

-determination of whether CWM, CWM degradation products, or decontamination agents are migrating from the suspected burial sites.

-characterize extent and volume of CWM contaminated soil and groundwater.

3.0 DETAILED DESCRIPTION OF TASKS.

3.1 TASK 1- REVIEW EXISTING DATA, SITE VISIT AND PREPARE WORK PLAN.

3.1.1 Review Existing Data. The A-E shall review the archive search report, Site Characterization Reports and other data provided by the Contracting Officer. It is not intended that this task be a "records search" where new information is located or developed.

3.1.2 Site Visit . The AE shall make a site visit and interview personnel knowledgeable of site conditions. The purpose of this task is to permit the AE's staff with direct project responsibility to gain necessary information about site conditions. Since potentially contaminated sites are to be visited by the AE, an abbreviated Site-Specific Health and Safety Plan (SSHP) must be prepared by the AE and submitted to CEHND-SO for prior review and approval. The AE is also required to have a written Safety and Health program in compliance with 29 CFR 1910.120 (b). The program shall be made available upon request. This abbreviated SSHP is to be prepared and utilized for the site visit only.

3.1.3 Prepare Work Plan. The A-E shall prepare and submit a Work Plan. The Work Plan shall describe in detail the site background and history, investigation objectives, all proposed investigative activities, equipment, and procedures, personnel, and schedule. The Work Plan shall include the following subplans and Standard Operating Procedures (SOPs).

3.1.3.1 Health and Safety Program (HSP). The A-E shall develop and maintain a Health and Safety Program in compliance with the requirements of OSHA standard 29 CFR 1910.120(b)(1) through (b)(4). Written certification that the HSP has been developed and implemented shall be submitted to the Contracting Officer and the plans shall be made available on request. The A-E shall develop a Site-Specific Safety and Health Plan (SSHP) in accordance with the requirements of Section 5.0 of this SOW. The SSHP shall be submitted to the Contracting Officer (CO) for review and approval. No field work shall be performed prior to the approval of the SSHP, and all work shall be in accordance with the approved plan. The SSHP shall specifically include an "Ordnance Management Plan" which addresses procedures to be followed should unexploded chemical or conventional ordnance (UXO) be encountered during any phase of field work.

3.1.3.2 Geophysical Investigation Plan. The intent of this plan is to have a method to identify and locate burial sites that may the locations of potential chemical warfare (CWM) or other hazardous materials. The AE shall review the Electromagnetic and Magnetic surveys performed by the US Army Corps of Engineers,

Waterways Experiment Station (Ref. 9.34) and coordinate the survey results with the potential burial sites suggested in the Archive Search report (Ref._), and other data made available to the AE either by the Contracting Officer or though the record search. If it is the AE's opinion that the information provided by the survey is deficient, this shall be clearly stated in a brief report to the Contracting Officer. The AE shall state the deficiency and the additional geophysical work including the locations and the equipment necessary to produce a comprehensive geophysical investigative plan. At the Contracting Officer's discretion, the AE may be directed to prepare the Supplemental Geophysical Plan described in the Optional Tasks, (Option 1.) All work performed under this task (and Option 1, if it is exercised) with the exception of secretarial and drafting, shall be performed and signed by a qualified geophysicists. The qualification, identification and responsibilities of the person(s) performing this task shall be made a part of the report.

3.1.3.3 Groundwater and Soil Sampling Plan.

The AE shall use the results of the geophysical investigation(s) and record review to prepare a plan to select sites for the collection of soil/groundwater samples for CWM analyses. There are currently, thirty five groundwater monitoring wells installed in the fluvial aquifer around DDMT. Of these eighteen wells are installed in Dunn Field and four are installed to the west of Dunn Field. If it is the AE's opinion that additional groundwater monitoring wells are needed to fully evaluate the presence of CWM, this shall be clearly stated and justified in the Plan. The AE shall identify the locations of existing monitoring wells from which groundwater samples will be collected and the proposed location(s) where the AE believes additional groundwater monitoring is/are needed. The AE's justification shall include the rationale, depths and methods of drilling. If optional wells are proposed by the AE, they shall not be installed, unless the AE is directed in writing by the Contracting Officer to do so.

The soil boring plan soil boring plan shall clearly state the number of proposed samples, depths and methods of collection. The Groundwater and Soil Sampling Plan shall include appropriate sized maps that clearly show the locations of proposed sampling sites. It shall also include the method of drilling, equipment, personnel and responsibilities of each person involved in the installation and collection of soil samples. All drilling activities must be supervised by an on-site geologist or geotehcnical engineer. Drilling and sample collection activities shall be in accordance with the protocol established in the Site Specific Health and Safety Plan for CWM (Ref___) and the Quality Assurance Project plans (Ref. 9.33) and this SOW.

3.1.4 Collection of Groundwater Samples. The AE shall collect one groundwater sample for CWM analysis from each monitoring wells located in proximity or downgradiednt from the suspected CWM sites identified in the geophysical investigation and record search. The samples shall be collected and analyzed in

accordance to the protocol established in the Quality Assurance project plans (Ref. 9.33) and this SOW.

3.2 Task 2 - Site Safety Submission. The A-E shall prepare a Site Safety Submission in accordance with the requirements of ER 385-1-92 and paragraph 10 of this SOW, detailing the precautions to be taken and procedures to be followed while performing intrusive work. The Site Safety Submission is subject to Government approval and no intrusive work shall take place prior to receipt of this approval.

3.3 TASK 3- LOCATION SURVEY AND MAPPING.

The A-E shall perform location survey and mapping of the areas under investigation. All surface soil samples, Soil borings, and monitoring wells included in Task 4 shall be located to within 1 foot horizontally on appropriate map sheets. Top of well casing elevations shall be recorded to the nearest 0.01 foot. Specific details of electronic files and mapping requirements were provided under Paragraph 6.0 of the Site Characterization Phase II Statement of Work (Annex R Appendix A).

3.4 TASK 4- PERFORM SOIL SAMPLING AND ANALYSIS.

3.4.1 Surface Soil Samples. The A-E shall obtain surface soil samples from the top 6 inches at selected sites which could potentially have been contaminated with CWM or decontamination products. These sites include Site #1, Site #9, and Site #24. Other sites may be proposed with adequate justification in the Work Plan for Government approval.

3.4.2 Soil Borings. The A-E shall drill soil borings at approximately 25 feet from the suspected burial pits and obtain soil samples at 1.5 foot intervals. The A-E shall use appropriate geophysical methods, to be proposed in the Work Plan for Government approval, to locate the borings in the field an appropriate distance from any geophysical anomalies. The number, depth, and location of soil borings shall be proposed in the Work Plan for Government approval. Construction of borings shall conform to the requirements of the DDMT Quality Assurance Project Plan (Reference 9.33).

3.4.3 Monitoring Wells. Monitoring wells shall be installed in the fluvial aquifer to determine if CWM contamination exists in ground water. At least one upgradient well shall be installed at each site, as well as sufficient downgradient wells to establish whether contaminants are migrating in the groundwater. The number, depth, and location of wells shall be proposed in the Work Plan for Government approval, and shall be emplaced, if at all possible, to correspond to locations identified in the applicable RI/FS Operable Unit Field Sampling Plan (References 2 through 5) to facilitate use in subsequent RI/FS activities. The A-E shall use appropriate geophysical methods, to be proposed in the Work Plan for Government approval, to locate the borings in the field an appropriate distance from any geophysical anomalies. Following installation and development, each well shall be sampled for subsequent analysis. Construction of monitoring wells shall conform to the requirements of the DDMT Quality Assurance Project Plan (Reference 9.33).

3.4.4 Chemical Analysis of Samples. Groundwater and soil samples shall be prescreened in the field for the presence of CWM. Samples field identified as containing CWM shall not be released

to any public courier, but shall remain in the physical custody of the A-E or designated Government agency and shall be transported under said custody to the approved laboratory for analysis. Samples collected shall be analyzed in the laboratory for CWM, CWM degradation products (Reference 9.5), and such other analytical parameters as the A-E shall propose in the Work Plan for Government approval. The A-E shall submit a letter report with the analytical results as soon as they become available. This report shall identify sampling location and depth and provide the analytical results only. No interpretation is expected in this report. A separate letter report for IDW, if required, shall identify the container identification number, the location and total number of containers in each area, the number of samples obtained to fully characterize the containers, the analytical methods run, the analysis obtained, and the recommendations proposed. Recommendations for off site IDW disposal shall include at a minimum the proposed disposal location(s), time frame associated with storage and removal, regulatory impacts, and cost.

3.5 TASK 5- IDW DISPOSAL The A-E shall if directed by the Contracting Officer containerize IDW (i.e. drill cuttings, purge water, development water, etc.). The drums shall be located, secured, labeled, sampled and analyzed in accordance with the

approved work plan. Upon receipt of the letter report recommending appropriate manifesting, transportation, and, disposal, the CO shall direct the A-E in the disposal of IDW. The A-E shall perform the IDW disposal in a timely manner as to not impact regulatory deadlines. Cost for the disposal of IDW shall be obtained in writing from a minimum of three independent sources.

3.6 TASK 6- ENGINEERING REPORT. Upon completion of field work and laboratory analysis, the A-E shall prepare an Engineering Report. The Engineering Report shall briefly describe previous work conducted at DDMT which has applicability in determining potential CWM contamination, the work conducted under this delivery order, and the results. The report shall also contain the A-E's conclusions as to the nature and extent of CWM contamination at the site, and recommendations for future work at the site. It is the Government's intent to utilize the report for development of safety criteria, for both site workers and nearby public areas, applicable to subsequent RI/FS activities at DDMT

3.7 Task 7 - Meetings and Public Involvement.

The A-E shall provide a minimum of three professionals, thoroughly familiar with the project, to attend a minimum of four meetings as scheduled below and any additional meetings as directed by the Contracting Officer. The meetings should last not more than two days. One of these meetings may be a public meeting to explain the planned work or its results to the local community. The A-E shall prepare a presentation, provide technical support and other support as directed by the Contracting Officer for this meeting.

3.8 Task 8 - Project Management. The A-E shall, during the life of the Delivery Order, manage the Delivery Order in accordance with the Statement of Work Appendix A. All project management associated with this Delivery Order, with the exception of direct technical oversight of work described in the preceding tasks, shall be accounted for in this task.

4.0 SCHEDULE OF MEETINGS AND DELIVERABLES

Task	Days after NTP

Draft Work Plan (8 copies)	TBD
Government Comments on Draft Work Plan	TBD
Final Work Plan (8 copies + computer file)	TBD
Government Comment on Final Work Plan	TBD
Letter Reports	TBD
Draft Engineering Report (8 copies)	TBD
Government Comments on Draft Engineering Report	TBD
Final Engineering Report (8 copies + computer file)	TBD
Government Comments on Final Engineering Report	TBD
Monthly Report	monthly

5.0 Submittals.

5.1 Format and Content of Engineering Report. All Drawings shall be of engineering quality with sufficient details. The report shall consist of 8 1/2" X 11". The report covers shall consist of durable binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A title shall identify the site, the A-E, the Huntsville Division, and date. The A-E identification shall not dominate the title page.

5.2 Review Comments. The A-E shall review all comments received through the CEHND Project Manager and evaluate their appropriateness based upon their merit. The A-E shall incorporate all applicable comments and provide a written response to each comment no later than 21 days after the A-E receives the comment.

5.3 Identification of Responsible Personnel. Each submittal shall identify the specific members and title of the subcontractor and A-E's staff which had significant input into the report. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

5.4 Presentations. The A-E shall make presentations of work performed according as directed by the Contracting Officer.

The presentation shall consist of a summary of the work accomplished and will be followed by an open discussion.

5.5 Minutes of Meetings. Following the presentation and the public meeting, the A-E shall prepare and submit minutes of the meeting within 10 calendar days to the Contracting Officer.

5.6 Correspondence. The A-E shall keep a record of phone conversation and written correspondence affecting decisions relating to the performance of this delivery order. A summary of the phone conversations and copies of written correspondence shall be submitted to the Contracting Officer with the monthly progress report.

5.7 Monthly Progress Report. The A-E shall prepare and submit monthly progress reports describing the work performed since the previous report, work currently underway and work anticipated. The report shall state whether current work is on schedule. If the work is not on schedule, the A-E shall state what actions are taken in order to get back on schedule. The

report shall be submitted to the Contracting Officer not later than the 10th day of each calendar month.

5.8 Computer Files. All final text files generated by the A-E under this delivery order shall be furnished to the Contracting Officer in WordPerfect 6.0, IBM PC compatible format. All drawings shall be on reproducible (mylar) and 3D design file in Intergraph Corporation format, compatible with CEHND Graphics system.

6.0 CHEMICAL DATA AND LABORATORY REQUIREMENTS

6.1 Quality Assurance Project Plan (QAPP). The AE shall prepare the QAPP. The QAPP shall describe the sampling and analyses, quality assurance and quality control methods, equipment, evaluations, reports and procedures as required for the work specified in this SOW. The plan shall describe field and laboratory procedures. The plan shall clearly describe how the AE shall ensure that sample integrity and chain of custody of all samples are not compromised prior to delivery to the laboratory, and should describe the procedures which will be used to document and report precision, accuracy and completeness of data results.

The plan shall be a brief and concise description of the field and laboratory work required. Previously prepared work plans for similar type of work shall be utilized as much as possible in the preparation of the plan. The data quality and quality control applies to both the field and laboratory efforts. Results of the field and laboratory controls shall be evaluated and placed in the analytical data submittal, and the draft and final Engineering Reports. The AE shall provide the laboratory QA/QC plan as an appendix to the QAPP. The plan shall address each requirement as identified in ER 1110-1-263 (Reference).

6.2 Laboratory Qualifications. The analytical laboratory utilized by the AE must be validated by the Corps of Engineers' Missouri River Division (CEMRD) and must have the capability to perform the analytical methods required by this SOW. The laboratory shall be an EPA contract lab or be familiar with the Contract Laboratory Program (CLP) requirements and can perform CLP work.

6.3 Coordination with Government Quality Assurance Laboratory. The AE must provide coordination and quality assurance samples (collected and transported by the AE) to the Government Quality Assurance (GQA) lab. Each field control

sample collected shall be divided equally, one portion sent to the GQA lab and the remainder sent to the AE's lab. GQA samples include all sample matrices and analysis parameters. The AE shall provide the GQA laboratory a two week notice of sample shipment. The Government will identify the GQA laboratory.

6.4 Data Reporting Requirements. The AE shall provide the following data reporting elements; sample ID, sample receipt, organic and inorganic reporting, internal quality control reporting (lab blanks, surrogate spike samples, lab duplicates or matrix spikes) and field duplicates and blanks. Data shall be provided in accordance with USACE requirements and USEPA requirements. These data shall be included in the raw data submittal as well as in electronic form in the engineering reports. The AE laboratory must hold and make available all project raw data for a period of five years after completion of this contract. The AE must validate all the data. Complete data validation shall be performed on 10% of the sample analysis packages.

6.4.1 Minimum Raw Data Reporting Requirements:

6.4.1.1 Sample IDs. The contractor shall prepare a tabular presentation which matches contract laboratory sample IDs to QA laboratory sample IDs. This table shall identify all Field Duplicates and Field Blanks (including rinsates and trip blanks) as such. This table shall also match all rinsates with their corresponding field samples as well as matching each trip blank with the samples that accompanied it during shipment.

6.4.1.2 Sample Receipt. The contractor shall complete and report a "Cooler Receipt Form" for all shipments for purposes of noting problems in sample packaging, chain-of-custody, and sample preservation. An example form is available from CEMRD-ED-GL.

6.4.1.3 General Organic and Inorganic Reporting. For each analytical method run, the contractor shall report all analytes for each sample as a detected concentration or as less than the specific limits of quantitation. Generally, all samples with out-of-control spike recoveries being attributed on matrix interferences shall be designated as such. All soil/sediment and solid waste samples shall be reported on a dry-weight basis with percent moisture also reported. The contractor shall also report

dilution factors for each sample as well as the date of extraction (if applicable) and date of analysis.

6.4.1.4 Internal Quality Control Reporting (at a minimum, internal quality control samples shall be analyzed at rates specified in the specific methods or as specified in the SOW if higher rates are required to meet project specific Data Quality Objectives):

6.4.1.4.1 Laboratory Blanks (Method Blanks and Instrument Blanks). All analytes shall be reported for each laboratory blank. All non-blank sample results shall be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.

6.4.1.4.2 Surrogate spike Samples. Surrogate Spike Recoveries shall be reported with all organic method reports where appropriate (i.e. when the method requires surrogate spikes). The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Any out-of-control recoveries (as defined in the specified

method) shall result in the sample being rerun (both sets of data are to be reported) or data being flagged.

6.4.1.4.3 Matrix Spike Samples. Matrix Spike Recoveries shall be reported for all organic and inorganic analyses. All general sample results shall be designated as corresponding to a particular matrix spike sample. The report shall indicate what field sample was spiked even if it was not a Corps of Engineers project sample. The report shall also specify the control limits for matrix spike results for each method for each matrix.

6.4.1.4.4 Laboratory Duplicates and/or Matrix Spike Duplicate Pairs. Relative Percent Difference shall be reported for all duplicate pairs as well as analyte/matrix specific control limits.

6.4.1.4.5 When run for internal quality control, Laboratory Control Standard's (LCS) results shall be reported with the corresponding field sample data. Control limits for LCSs shall also be specified.

6.4.1.5 Field Duplicates and Field Blanks. These samples shall be identified as such by the contractor and reported as any other field sample. Relative Percent Differences shall be reported for all field duplicate pairs.

6.5 Data Quality. The AE shall provide a data quality level that is compatible with an RI/FS study. The data quality must be sufficient to be utilized in the Camp Sibert site wide RI/FS, Risk Assessment, and Remedial Action Plans that will be prepared by the US Army Corps Of Engineers, Mobile District. The AE shall provide quality control of the various analytical tasks performed.

7.0 Soil Boring and Monitoring Well Installation Requirements.

7.1 General Requirements. All borings and well installations shall be overseen by a qualified geologist or geotechnical engineer. Boring logs shall be prepared on 8 1/2 by 11 inch sheets, identifying the boring or well number, the location, stratigraphy, soil type according to the Unified Soil Classification System (ASTM D 2487), sampling locations, date begun, date finished, depth to groundwater (both at first encounter and after it has stabilized), elevation of the ground

surface at the top of hole (if available), type of drilling equipment and sampling tools, and name of the driller and of the logger. A separate well construction log shall be prepared for each well showing details of the well construction, including screened interval, materials used for casing, screen, sand pack, seal, and grout, dates of starting and completion, and name of the driller and the logger. The A-E shall obtain all necessary permits for boring and well construction.

7.2 Soil Borings. Soil boring methods shall be chosen to minimize the quantity of IDW. The sampling objectives are to obtain representative analytical samples of each soil layer, minimize cross-contamination between layers, and provide an understanding of site stratigraphy. Detailed geotechnical analysis of soil samples is not required. The specific methods and equipment to be used shall be described in the Work Plan for Government approval. After borings are complete, they shall be abandoned by grouting from the bottom to the top of the boring with Portland cement grout. If allowed by state requirements, 3% by weight of bentonite powder shall be mixed with the cement used for mixing grout.

7.2 Monitoring Wells. Monitoring wells shall be installed to evaluate the groundwater piezometric levels across each site and allow for periodic sampling for chemical analysis. Well depths

shall be selected and construction details shall be such as to minimize the potential for cross contamination between different aquifer zones. Drilling fluid shall not be used without express permission of the Government, and only formation water shall be used if the use of drilling fluid is necessary. Soil samples shall be obtained from the target screened interval and analyzed for Atterberg limits (ASTM D 4318), grain size (ASTM C 136), and soil type (ASTM D 2487). At least two samples shall be obtained and tested from each well boring. The sand pack gradation and screen slot size shall be chosen to suit the gradation of the in situ soils and minimize migration of fines into the well. A 2 foot sand sump shall be provided below the screened interval. Immediately above the sand pack, a 5 foot layer of bentonite pellets shall be tamped in place around the casing. The remainder of the borehole annulus shall be filled with Portland cement grout, placed from bottom to top. If allowed by state requirements, 3% by weight of bentonite powder shall be mixed with the cement used for mixing grout. After the grout has cured for a minimum period of 48 hours, the well shall be developed by pumping and/or surging until the well water has clarified and water temperature, pH, specific conductivity, and other parameters have stabilized. Any well to be abandoned for any reason shall be grouted from the bottom to the top with Portland cement grout, and the casing cut off 2 feet below ground surface.

7.3 Groundwater Sampling. Prior to collection of groundwater samples, the well shall be purged by removal of at least five well volumes and allowed to recover. If the well does not recover quickly enough to allow the removal of five well volumes, the well shall be bailed or pumped dry and allowed to recover.

8.0 Public Affairs. The A-E shall not publicly disclose any data generated or reviewed under this contract. The A-E shall refer all requests for information concerning the site condition to the CEHND Project Manager. Reports and data generated under this delivery order are the property of the Department of Defense and distribution to any other sources by the A-E, unless authorized by the Contracting Officer, is prohibited.

9.0 References.

9.1 "U.S. Army Corps of Engineers Safety and Health Requirements Manual", U.S. Army Engineer Manual EM 385-1-1, April 1981 (revised October 1987).

9.2 "Archives Search Report, Defense Depot Memphis Tennessee", St. Louis District, U.S. Army Corps of Engineers, January, 1995.

9.3 "Safety Concepts for Unexploded Ordnance", Huntsville Division, U.S. Army Corps of Engineers.

9.4 "Environmental Chemistry and Fate of Chemical Warfare Agents". Southwest Research Institute. Prepared for Corps of Engineers, Huntsville Division, March 3, 1994.

9.5 "Field Manual on Environmental Chemistry and Fate of Chemical Warfare Agents". Southwest Research Institute. Prepared for Corps of Engineers, Huntsville Division, July 7, 1994.

9.6 Army Regulation (AR) 385-40, Accident Reporting and Records

9.7 "Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions", Engineer Regulations 385-1-92, 18 March 1994.

9.8 "Chemical Data Quality Management for Hazardous Waste Remedial Activities", Engineer Regulation 1110-1-263, 1 Oct 90.

9.9 Occupational Safety and Health Administration Standards (29 CFR 1910 and 1926).

9.10 NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985.

9.11 ANSI Z-358.1 "Emergency Eyewash and Shower Equipment", 1990.

9.12 ANSI Z-288.2 "Practices for Respiratory Protection", 1980.

9.13 RCRA Ground water Monitoring Technical Enforcement Guidance Document.

9.14 "Test Methods for Evaluating Solid Wastes," USEPA Pub. No. SW- 846, Latest Ed.

9.15 "Annual Book of ASTM Standards", Current edition.

9.16 "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" EPA/540/G-89/004, October 1988.

9.17 "Chemical Quality Management -- Toxic and Hazardous" U.S. Army Engineering Regulation No. ER 1110-1-163, Current Edition.

9.18 U.S. Environmental Protection Agency (EPA). 1988b. CERCLA Compliance With Other Laws Manual. Parts I and II.

9.19 U.S. Environmental Protection Agency (EPA). 1989e. Methods for Evaluation the Attainment of Cleanup Standards. Volume I - Soils and Solid Media.

9.20 U.S. Environmental Protection Agency (EPA); Methods for the Determination of Organic Compounds in Drinking Water, Dec 1988

9.21 U.S. Army Corps of Engineers, 1994, Cost Engineering Policy, U.S. Army Engineering Regulation No. 1110-3-1301, April.

9.22 Code of Federal Regulations. 40 CFR, Parts 190-299. latest edition.

9.23 Code of Federal Regulations. [n.d.] "Hazardous Waste Operations and Emergency Response." CFR 1910.120, Final Rule.

9.24 U.S. Army Corps of Engineers. 1989. "Minimum Chemistry Data Reporting Requirements for DERP and Superfund HTW Projects." Memorandum, CEMRD-ED-GL. August.

9.25 U.S. Environmental Protection Agency (EPA). 1987. Compendium of Superfund Field Operations Methods.

9.26 U.S. Environmental Protection Agency (EPA). 1988c. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA 540/g89/004. October.

9.27 "Defense Depot Memphis Tennessee Generic Remedial Investigation / Feasibility Study Workplan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.28 "Defense Depot Memphis Tennessee Operable Unit 1 Remedial Investigation / Feasibility Study Workplan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.29 "Defense Depot Memphis Tennessee Operable Unit 2 Remedial Investigation / Feasibility Study Workplan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.30 "Defense Depot Memphis Tennessee Operable Unit 3 Remedial Investigation / Feasibility Study Workplan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, April, 1995.

9.31 "Defense Depot Memphis Tennessee Operable Unit 4 Remedial Investigation / Study Feasibility Workplan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.32 "Defense Depot Memphis Tennessee Generic Screening Sites Field Sampling Plan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.33 "Defense Depot Memphis Tennessee RI/FS Quality Assurance Project Plan", Draft-Final, CH2M-Hill, Inc./ Prepared for Corps of Engineers, Huntsville Division, March, 1995.

9.34 "Electromagnetic and Magnetic Surveys at Dunn Field, Defense Depot Memphis Tennessee", Technical Report GL-94-8, Waterways Experiment Station, U.S. Army Corps of Engineers, March 1994.

** Additional References may be incorporated and will be finalized at the completion of negotiations.

10.0 MANAGEMENT OF FUNDS

No transfer of funds by the AE between tasks will be allowed without prior approval of the Contracting Officer or the Contracting Officer's representative.

11.0 SAFETY REQUIREMENTS

11.0.1. The AE shall have developed and implemented a Health and Safety Program in compliance with the requirements of OSHA standard 29 CFR 1910.120 (b)(1) through (b)(4) as required for this effort. Written certification that the health and safety program has been developed and implemented shall be submitted to the Contracting Officer. The written program shall be made available upon request.

11.0.2. The AE shall prepare and submit a Site Safety and Health Plan (SSHP) to the Contracting Officer for review and approval prior to commencement of any field work. The SSHP shall be prepared in accordance with the requirements specified in this section and shall comply with all federal, state and local health and safety requirements, e.g., the Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926), the U.S. Environmental Protection Agency (USEPA) hazardous waste requirements (40 CFR 260-270), the U.S. Army Corps of Engineers Safety and Health Requirements Manual, (EM 385-1-1) and the Defense Depot Region West, Tracy Safety Office requirements. The AE shall prepare amendments as necessary to the Site Safety and Health Plans (SSHP) based on the specific requirements of this SOW. The site specific information as amended in the appendices

along with the generic sections of the SSHP will serve as the Site Safety and Health Plans (SSHP's) for the sites to be investigated. The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be accomplished, and to the hazards anticipated. Where use of a specific element is not applicable to the project, the AE shall make a negative declaration to establish that adequate consideration was given the topic, and give a brief justification for its omission or reduced level of detail. The SSHP shall address all elements as applicable to describe how the AE will implement the on-site safety and health requirements.

11.1 General. The development and implementation of the SSHP shall be overseen by a board certified Industrial Hygienist (CIH) with hazardous waste site operations experience. The CIH shall be responsible for the development, implementation and oversight of the AE's health and safety program and site safety and health plan. Board certification shall be documented by written confirmation by the American Board of Industrial Hygiene (ABIH) and submitted to the Contracting Officer. A fully trained and experienced site safety and health officer (SSHO), responsible to the AE may be delegated to implement the on-site elements of the SSHP. The SSHP amendments shall be signed and dated by the CIH prior to submittal.

11.2 Staff Organization, Qualifications and Responsibilities. Each person assigned specific safety and health responsibilities shall be identified and his/her qualifications and experience documented by resume. Each SSHP shall identify key personnel. The operational and health and safety responsibilities of each key person shall be discussed. The organizational structure, with lines of authority and overall responsibilities for safety and health of the AE and all subcontractors shall be discussed. An organizational chart showing the lines of authority for safety shall be provided.

11.3 Site Description and Contamination Characterization. In the SSHP the AE shall identify each site and describe the work to be done at each site. A complete list of chemical, physical and safety hazards anticipated shall be provided for each site. A complete summary of specific chemical, physical and safety hazards anticipated shall be provided. The site descriptions shall be based on results of previous studies.

11.4 Hazard Assessment and Risk Analysis. In the SSHP's, the AE shall provide a complete description of the work to be performed at each site. The AE shall identify the chemical, physical, safety and biological hazards that may be encountered

for each task and/or site operation to be performed. Each task/operation is to be discussed separately. Routes and sources of exposure for selected chemical hazards anticipated on-site along with chemical/biological names, concentration ranges, media in which found, locations on-site, estimated quantities/volumes, and the applicable regulatory standards (PEL's) and recommended protective exposure levels (TLV's) shall be provided. Selection of chemicals as indicators of hazard shall be based upon media concentration (i.e. water, air, soil), toxicity, volatility or risk potential for air entrainment at hazardous levels, and frequency of detection. Action levels based on airborne hazards and direct skin contact shall be specified and justified for implementation of engineering controls/and or work practice controls, for upgrades/downgrades in levels of personnel protection, for emergency evacuation of on-site personnel, and for the prevention and/or minimization of public exposure to hazards created by on-site activities.

11.5 Accident Prevention. The SSHP may serve as the Accident Prevention plan required by contract clauses provided it addresses all content requirements of both 29 CFR 1910.120 and EM 385-1-1 (Table 1). All Accident Prevention Plan elements required by EM 385-1-1 but not specifically covered by these elements shall be addressed in this section. Daily safety and

health inspections shall be conducted to determine if site operations are conducted in accordance with the approved SSHP and contract requirements.

11.6 Training. Training for all on-site personnel to include initial, site specific, supervisory, and refresher training shall be in accordance with 29 CFR 1910.120 Final Rule. All authorized visitors to the site shall be given a pre-entry site safety and health briefing. The type including initial supervisory, refresher, and site specific, duration and dates of all employee training performed shall be listed by employee name and certified in the SSHP. Material Safety Data Sheets (MSDS) for each hazardous substance anticipated to be brought on to or used on site shall be made accessible to site personnel at all times and shall be submitted in an appendix to the SSHP.

11.7 Personal Protective Equipment. Minimum levels of protection necessary for each task/operation to be performed at each site based on probable site conditions, potential occupational exposure (including heat stress) and the hazard assessment/risk analysis required in paragraph 11.4 shall be described in each SSHP. Include specific types and materials for protective clothing and respiratory protection. Establish and justify upgrade/downgrade criteria based upon the action levels

established as required by paragraph 11.4. Provided site specific procedures to determine PPE program effectiveness and for on-site fit testing of respirators, proper cleaning, maintenance, inspection, and storage of all PPE.

11.8 Medical Surveillance. All personnel performing on-site activities shall participate in an ongoing medical surveillance program meeting the requirements of 29 CFR 1910.120 and ANSI Z-88.2. The medical examination protocols and results shall be overseen by a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. Specify minimum specific exam content and frequency based on probable site conditions, potential occupational exposures and required protective equipment. Certification of participation in the Medical Surveillance Program, the date of last examination and name of the reviewing occupational physician shall also be included for each affected employee. A written medical opinion from the examining physician shall be made available to the CO or approving authority upon request for any site employee.

11.9 Environmental and Personal Monitoring. The AE shall specify for on-site and perimeter, the types and frequency of

monitoring/ sampling to be performed. All monitoring and sampling protocol shall be discussed in detail. Air monitoring and air sampling must accurately represent concentrations airborne contaminants encountered on and leaving the site. Include instrumentation to be used calibration to be performed, and methods to be used. Include, as appropriate, real-time (direct-read) monitoring and integrated Time Weighted Average (TWA) sampling for specific contaminants of concern. When applicable, NIOSH and or EPA sampling and analytical methods shall be used. Personal samples shall be analyzed only by laboratories successfully participating in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or laboratory Accreditation Program. Noise and radiation monitoring shall be conducted as needed depending upon the site hazard assessment. Meteorological monitoring shall be performed on-site and used as an adjunct in determining perimeter and any off-site monitoring locations. Where perimeter monitoring/sampling is not deemed necessary, a suitable justification for its exclusion shall be provided. Any monitoring procedures or instrumentation that are not generic to each site must be described in detail in each of the site specific plans. All monitoring results shall be compared to action levels to determine the need for corrective actions. The AE

shall identify persons who will be performing the monitoring and include their qualifications.

11.10 Site Control. The SSHP's shall include site maps, description of work zone delineation, on/off site communication systems, site access controls, and security procedures.

11.11 Personnel and Equipment Decontamination. The AE shall develop and specify decontamination procedures in accordance with 29 CFR 1910.120 for personnel, personal protective equipment, monitoring instruments, sampling equipment, and heavy equipment. Decontamination procedures shall address specific measures to ensure that contamination is confined to the work site. Necessary facilities and their locations shall be specified.

11.12 Emergency Response; Equipment and Procedures. An Emergency Response Plan as required by 29 CFR 1910.120 shall be prepared. Specify the emergency equipment and the location of such equipment to be present on site. Provide telephone numbers and points of contact for emergency services and the appropriate Governmental Representatives. A map showing the route to the hospital that has been contacted and informed of the type of work and potential hazards on the site and which has committed to

respond in the event of an emergency shall be provided. At least one person trained and certified in first aid/CPR is to be on site at all times during site operations. The first aid/ CPR attendant(s) shall be identified and credentials provided. The AE shall include personnel roles, lines of authority, lines of communication and the criteria and procedures for site evacuation.

11.12.1 On-Site Emergency and First Aid Equipment. At a minimum, as applicable, the following emergency and first aid equipment shall be on-site: (1) First aid equipment and supplies approved by the consulting physician; (2) Emergency eye washes/showers which comply with ANSI Z-358.11 (3) Emergency-use respirators (worse case appropriate); (4) Fire extinguishers (specify type and size) and (5) Spill control materials and equipment. Specify in the plan the location(s) of these materials.

11.13 Standard Operating Procedures, Engineering Controls and Work Practices. The AE shall develop Standing Operating Procedures for minimizing hazards and taking action to correct hazards where necessary. Site rules and prohibitions for safe work practices shall be discussed and shall include such topics as use of the buddy system, smoking restrictions, material handling procedures, confined space entry, excavation safety,

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physiological and meteorological monitoring for heat/cold stress, illumination, sanitation, and daily safety inspections, etc. This list of topics is not intended to be all inclusive.

11.14 Logs, Reports and Recordkeeping. Recordkeeping procedures for training logs, daily safety inspection logs, employee/visitor registers, medical surveillance records and certifications, air monitoring results and personal exposure records shall be described. All personnel exposure and medical monitoring records shall be maintained in accordance with applicable OSHA standards, CFR 1904, 1910 and 1926. All recordable accidents/injuries/ illnesses shall be reported to the CO immediately. A completed ENG 3394, Accident Investigation Report, shall be submitted within two working days in accordance with AR 385-40 and USACE Supplement 1 to that regulation and a copy provided to CEHND-PM-EP.

11.15 Explosive Ordnance. The facility was a former military installation. If known or potential ordnance, explosives, or chemical warfare materials contamination or materials are discovered at any time during operations at the site, the AE shall mark the location, immediately stop operations in the affected area, and notify the Contracting Officer. The Government will make appropriate arrangements for evaluation and

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proper disposal of the suspected device. It is anticipated that in the event that such conditions arise, only slight delays should result to the AE. It is the express intention of the Government that the AE is not to drill, excavate, or otherwise physically disturb the subsurface directly where ordnance, agent or explosives may reasonably be suspected. The AE's SSHP shall specifically include the topics addressed in this paragraph.

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