APPENDIX C
Safety and Health Elements For HTRW Documents (SSHPs/HSDAs)

C-1. Site Description and Contamination Characterization

a. Describe the site location, topography, approximate size, and the past uses of the site.

b. Compile a complete list of the contaminants found (or thought to be found) or known to be present in site areas on which worked will be done. Compilation of this listing shall be based on results of previous studies; or, if not available, select the likely contaminants based on site history and prior site uses and activities. Include, as applicable, the chemical names, radioisotopes, concentration ranges (and strength of radiation fields and levels of radioactive contamination if appropriate), media in which found, locations on site, and estimated quantities/volumes to be affected by site work.

C-2. Hazard/Risk Analysis. Develop an Activity Hazard Analysis (AHA) per EM 385-1-1 requirements for each task or operation to be performed. Identify the safety, chemical, physical, radiological, biological, and Ordnance and Explosives hazards/risks presented by each task and operation. The tasks and hazard/risk analyses shall be modified as needed to address changing work conditions. The Hazard/Risk Analysis shall address the following:

a. Safety. Evaluate the potential for injury from all site conditions and activities (e.g., confined space entry, excavations, slips, trips and falls, electricity, equipment, and machinery, etc.) Use EM 385-1-1 as a resource to define potential safety hazards on the project.

b. Chemical. List the chemical hazards that may be encountered during site activities and evaluate their chemical, physical, and toxicological properties. Describe the sources and pathways of employee exposure. Address Federal, state and local regulations or recommended exposure standards. Address hazards associated with treatment process chemicals used in HTRW treatment O&M activities and other hazardous substances bought on site for the execution of site activities.

c. Physical. Evaluate the potential for injury from physical agents such as noise, heat and cold stress, vibration, etc., that may be present.

d. Radiological. Evaluate the risk to human health caused by radioactive materials or ionizing radiation fields in the area where work is to be done. Consider the presence of radioactive isotopes and the type of ionizing radiation they emit. Describe the sources and

pathways of employee internal exposure, and anticipated on- and off-site internal and external levels. Address Federal, state and local regulations or recommended exposure standards.

e. Biological. Evaluate the potential for illness or injury attributable to biological agents (e.g., poisonous plants, animals, insects, microorganisms).

f. Ordnance and Explosives (OE). Evaluate the probability of encountering OE while doing on-site work. Follow the requirements of EP 75-1-2 and the OE MCX if there is a need to specify OE avoidance procedures while cleanup is being done.

C-3. Occupational Exposure Action Levels. Establish action levels for the following project-specific actions:

a. Implementation of engineering controls and work practices.

b. Upgrades/downgrades in levels of personal protective equipment.

c. Work stoppage or emergency evacuation of on-site personnel.

d. Prevention or minimization of public exposures to hazards created by site activities.

C-4. Staff Organization, Qualifications, and Responsibilities. Provide the following information:

a. Develop an organizational structure that establishes a SOH chain of command for the project and SOH responsibilities for all project personnel. Address roles and responsibilities for each of the following personnel and any other professional staff with responsibilities that directly affect project SOH procedures:

(1) Safety and Health Manager (SHM).

(2) Site Safety and Health Officer (SSHO).

(3) Safety and Health Technicians (if required).

(4) Site Workers.

(5) Subcontractors.

b. Fully trained and experienced technicians, responsible to the contractor and the SSHO, may be delegated to implement monitoring and calibration of instruments, and assist the SSHO in enforcing the SSHP.

c. At least two persons currently certified in First Aid/CPR by the American Red Cross or equivalent agency, according to EM 385-1-1, shall be present on-site at all times during operations.

C-5. Training. All personnel doing on-site work that will expose them to contaminant-related health and safety hazards must comply with training requirements in 29 CFR 1910.120/29 CFR 1926.65 and the following. Personnel or contractors who will not be exposed to contaminant-related hazards need not comply with this requirement.

a. Off-site Training.

(1) 40 hours HTRW health and safety training prior to on-site deployment.

(2) Three days of actual field experience under the direct supervision of a trained, experienced supervisor

(3) Eight hours of refresher training annually.

(4) Supervisors shall complete the above requirements and an additional 8-hour supervisor's course covering at least the following topics:

(*a*) The employer's safety and health program.

(*b*) Personal protective equipment program.

(*c*) Spill containment program.

(*d*) Health hazard monitoring techniques.

b. On-site Training. The SSHO shall conduct on-site training for employees and visitors.

(1) Training specific to OSHA standards in 29 CFR 1926 and 29 CFR 1910 that are applicable to site work and operations.

(2) Site- and facility-specific training covering all elements in the SSHP. Site-specific training shall be updated as site circumstances warrant.

(3) Radiation safety training per 10 CFR 20 requirements, if applicable. 10 CFR 20 requires that employees working with radiation receive training to the extent that they can safely perform their jobs. Training shall also comply with applicable OSHA, DOE, and Agreement State requirements (which may be more stringent). Employees shall be instructed in the following:

(*a*) Site-specific procedures for handling and storing radioactive materials.

(*b*) Health and safety hazards associated with exposure to the radioactive material that will be cleaned up or otherwise handled and the purpose and function of protective devices and precautions used to minimize exposure.

(*c*) Elements of the SSHP and company-specific procedures intended to provide protection from radiation exposure.

(*d*) Worker responsibility to report any unsafe acts or procedures that might result in exposure to ionizing radiation.

(*e*) Appropriate worker response procedures to on-site events and occurrences that may result in worker exposure.

(*f*) Worker rights and responsibilities with respect to ionizing radiation exposure.

c. Documentation. All safety and health training, including names of employees, duration, contents, and dates of training, shall be appended to the SSHP must be documented.

C-6. Personal Protective Equipment

a. A written Personal Protective Equipment (PPE) program in accordance with 29 CFR 1910.132, 29 CFR 1910.120(g)(5)/29 CFR 1926.65(g)(5) and the respiratory protection requirements of 29 CFR 1910.134 is required. When working with radioactive material, the respiratory protection requirements of 10 CFR 20 must be met.

b. Provide a detailed description of the minimum PPE and specific materials from which the PPE components are constructed for each site-specific task to be performed, based upon the hazard/risk analysis performed above. Levels of protection must be relevant to site-specific conditions, including potential heat stress and associated PPE safety hazards.

c. Provide 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.

C-7. Medical Surveillance

a. All personnel and contractors performing on-site work that will expose them to contaminant-related health and safety hazards must be enrolled in a medical surveillance program meeting OSHA's requirements in 29 CFR 1910.120 (f)/29 CFR 1926.65(f), ANSI Z-88.2 and 10 CFR 20 and the following: USACE personnel shall follow the requirements prescribed in EP 385-1-40, USACE Occupational Health Program and USACE Policy Memorandum, Subject: *HTRW Medical Surveillance Program Inclusion and Frequency Criteria*, dated 29 September 1999. Personnel or contractors who will not be exposed to contaminant-related hazards need not comply with this requirement.

b. In consultation with the Occupational Physician, determine the minimum content and frequencies of necessary medical examinations and tests. This determination shall be based upon probable site conditions, chemical-specific OSHA standards, potential occupational exposures, and required protective equipment.

c. Examinations shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine. Examination/test results shall be reviewed by the Occupational Physician.

d. Certification of employees' participation in the medical surveillance program shall be appended to the SSHP. This certification shall include the employee's name, the date of last examination, and name of reviewing occupational physician.

e. The written opinion from the occupational physician required by 29 CFR 1910.120(f)(7)/29 CFR 1926.65(f)(7) shall be made available upon request to the CO or approving authority for any site employee.

f. All personnel medical monitoring records shall be maintained in accordance with 29 CFR 1910.1020.

C-8. Radiation Dosimetry

a. All employees working within a radiologically restricted area shall receive appropriate dosimetry monitoring for radiation exposure.

b. Radiation dosimetry shall be evaluated by an individual holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP). Electronic dosimetry may be used to assign external dose if approved by the Qualified Health Physics personnel.

c. All employers (contractors and USACE elements) shall document employee exposure to external radiation. To do this, employers shall review each employee's radiation exposure history as per 10 CFR 20.2104 for compliance with exposure standards prior to allowing the employee access to a restricted area. If the employee has no exposure history, the employee shall provide a signed written statement to that effect.

d. When there exists the possibility of internal radioactive contamination, employers (contractors and USACE elements) shall estimate exposure with a bioassay program. The bioassay program will provide sampling of employee nasal passages, urine, or feces, or whole body counting, as appropriate to evaluate the suspected radionuclides. Air monitoring will be used to estimate inhalation exposure to suspected radionuclides.

e. Reports of *Exposure to Ionizing Radiation* will be furnished to each employee:

(1) Annually.

(2) Upon termination.

(3) Within 30 days of any personal request.

(4) To the Radiation Safety Officer (RSO) as soon as available.

C-9. Exposure Monitoring/Air Sampling Program

a. Where it has been determined that there may be potential employee exposures to hazardous concentrations of airborne substances, appropriate direct-reading (real-time) air monitoring and time-integrated (time-weighted average [TWA]) air sampling shall be conducted in accordance with applicable regulations (OSHA, EPA, NRC, State). Air monitoring and air sampling must accurately represent concentrations of airborne contaminants encountered on the site. When appropriate, air sampling shall be conducted to identify the radioactive isotopes and corresponding radiation (alpha, beta, gamma) in the workplace atmosphere. A record of exposure monitoring results shall be maintained by the SSHO and reviewed by the SHM for the duration of cleanup related activities.

b. Real-time screening for ionizing radiation and radioactive materials shall be conducted prior to and during on-site activities where ionizing radiation or radioactive materials may be encountered. When possible, determine the radiation (alpha, beta, gamma) and the exposure rate for each source of radiation.

c. Sampling and analytical methods following NIOSH criteria for on-site personnel and good practice as per 10 CFR 20 subparts C and F for airborne radioactive isotope sampling shall be appropriately used.

d. Personal exposure samples shall be taken if necessary to monitor employee exposure and to comply with chemical specific OSHA standards. Exposure samples shall be analyzed by an American Industrial Hygiene Association (AIHA) accredited laboratory.

e. Noise monitoring shall be conducted as needed, depending on the hazard/risk analysis.

f. All monitoring/sampling results shall be evaluated and appropriate actions implemented based upon "action levels" established pursuant to paragraph C-3 above.

g. Exposure monitoring results shall be documented and the records maintained in accordance 29 CFR 1910.1020.

C-10. Heat/Cold Stress Monitoring and Management

a. A site-specific heat/cold stress monitoring procedure shall be developed. See 06.J.of EM 385-1-1.

b. Body fluids lost through sweating in hot work environments shall be replaced by drinking plain cool water. See 06.J. of EM 385-1-1.

c. In situations where heat stress may impact worker safety and health, worker acclimatization shall be assessed and work-rest regimens shall be established and monitored. See 06.J.of EM 385-1-1.

C-11. Standard Operating Safety Procedures, Engineering Controls, and Work Practices.

Address, as appropriate:

a. Site rules/prohibitions (buddy system, eating/drinking/ smoking restrictions, etc.).

b. Work permit requirements (e.g., radioactive work, excavation, hot work, confined space, etc.).

c. Material handling procedures (soils, liquids, radioactive materials).

d. Drum/container handling procedures and precautions (opening, sampling, overpacking).

e. Confined space entry procedures.

f. Hot work, sources of ignition, fire protection/prevention, and electrical safety (ground-fault protection, overhead power line avoidance, etc.).

g. Excavation and trench safety.

h. Guarding of machinery and equipment.

i. Lock-out/tag-out.

j. Fall protection.

k. Hazard communication.

l. Illumination.

m. Sanitation.

n. Engineering controls.

o. Process safety management.

p. Signs and labels.

q. Laboratory safety.

r. Hazardous material handling and storage.

C-12. Site Control Measures

a. Establish work zones and access points. Work zone delineation (Exclusion Zone, including restricted and regulated areas, Contamination Reduction Zone, Support Zone) shall be based upon the complexity of site operations and the hazard/risk analysis performed pursuant to paragraph C-2 above.

b. Include a site map delineating the zones established above.

c. On sites where ionizing radiation or radioactive material may be encountered, designate restricted areas (Radiation Areas, High Radiation Areas, and Airborne Radioactive Contamination Areas, as defined in 10 CFR 20).

d. Describe on-site and off-site communications.

e. Describe site security (physical and procedural).

f. Describe general site access.

C-13. Personal Hygiene and Decontamination

a. Specify necessary facilities and their locations.

b. Provide detailed standard operating procedures, frequencies, supplies, and materials to decontaminate site personnel.

C-14. Equipment Decontamination

a. Specify necessary facilities, equipment, and their locations.

b. Provide detailed procedures, frequencies, supplies, materials for decontamination, and methods to determine adequacy of decontamination of equipment used on site. For sites where radioactive contamination is present, include levels of removable and fixed contamination acceptable for release from the exclusion zone.

C-15. Emergency Equipment and First Aid Requirements. The following items, as appropriate, shall be immediately available for on-site use:

a. First aid equipment and supplies approved by the consulting physician.

b. Emergency eyewashes/showers (per ANSI Z-358.1).

c. Emergency-use respirators, (i.e., for escape: 5–15 minute emergency escape mask with air bottle; for rescue: positive pressure self-contained breathing apparatus [SCBA]).

d. Spill control materials and equipment.

e. Fire extinguishers (specify type, size, locations).

C-16. Emergency Response and Contingency Procedures (On-Site and Off-site)

a. Local fire/police/rescue authorities having jurisdiction and nearby medical facilities that would be utilized for emergency treatment of injured personnel shall be contacted to notify them

of upcoming site activities and potential emergency situations, to ascertain their response capabilities, and to obtain a response commitment.

b. An Emergency Response Plan, which complies with 29 CFR 1910.120(l)/29 CFR 1926.65(l), and which, as a minimum, addresses the following elements, shall be developed and implemented:

(1) Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposures, personal injuries, fires/explosions, environmental spills and releases, and discovery of radioactive materials.

(2) Personnel roles, lines of authority, communications.

(3) Posted instructions and list of emergency contacts: physician/nearby medical facility, fire and police departments, ambulance service, Federal/state/local environmental agencies, CIH/CSP/CHP, Contracting Officer, or approving authority for in-house activities.

(4) Emergency recognition and prevention.

(5) Site topography, layout, and prevailing weather conditions.

(6) Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distances, places of refuge, evacuation routes, site security, and control).

(7) Specific procedures for decontamination and medical treatment of injured personnel.

(8) Route maps to nearest pre-notified medical facility.

(9) Criteria for initiating community alert program, contacts, and responsibilities.

(10) Critique of emergency responses and follow-up.

c. If all personnel will be evacuated from the site and not allowed to assist in handling the emergency, the emergency response plan listed in Paragraph C-15*b* may be replaced by an emergency action plan complying with 29 CFR 1910.38(a).

C-17. Accident Prevention

a. Daily safety and health inspections shall be conducted to ensure the effectiveness of the SSHP, and to determine if operations are being conducted in accordance with the SSHP, USACE, and OSHA regulations, and contract requirements.

b. In the event of an accident or incident, the CO (or approving authority for in-house USACE activities) shall be notified according to EM 385-1-1. Within two working days of any reportable accident, the contractor (or responsible USACE supervisor for in-house USACE activities) shall complete and submit required Accident Reports. If there is an accident involving radiation, the RPO for the USACE Geographic Command or the Radiation Protection Staff Officer (located at HQUSACE, CESO) shall be notified immediately.

C-18. Logs, Reports, and Recordkeeping

a. The following logs, reports, and records shall be developed, retained, and submitted to the CO (or approving authority for in-house activities):

(1) Training logs (site-specific and visitor), and records of radiological instructions and notices to workers.

(2) Daily safety inspection logs (may be part of the Daily QC Reports).

(3) Equipment maintenance logs.

(4) Employee/visitor register.

(5) Environmental and personal exposure monitoring and sampling results.

b. For work involving exposure to radiation, the following additional logs, reports, and records shall be developed, retained, and submitted to the CO (or approving authority for in-house activities):

(1) Records of radiation surveys, monitoring and disposal as per 10 CFR 20 subpart L.

(2) Reports of loss of licensed material as per 10 CFR 20.402.

(3) Notification of incidents as per 10 CFR 20 subpart M Reports.

(4) Reports of overexposure and excessive levels and concentrations as per 10 CFR 20.405.

(5) Notification and reports to individuals as per 10 CFR 20.409.