



US Army Corps
of Engineers®
ORGANIZATION AND FUNCTIONS

U.S. ARMY CORPS OF ENGINEERS FACILITIES EXPLOSIVES SAFETY MANDATORY CENTER OF EXPERTISE

ENGINEER REGULATION

ER 1110-1-8169
01 Oct 2018

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CECW-EC

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

ER 1110-1-8169

Regulation
No. ER 1110-1-8169

01 October 2018

Engineering and Design
U.S. ARMY CORPS OF ENGINEERS FACILITIES EXPLOSIVES SAFETY
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TABLE OF CONTENTS

Paragraph	Page
1. Purpose	1
2. Applicability	1
3. Distribution Statement.....	1
4. References	1
5. Establishment	2
6. Mission.....	3
7. Organization	3
8. Technical Competencies.....	3
9. Roles and Responsibilities.....	3
10. Mandatory Services	6
11. Voluntary Services	7
12. Method of Operation	9
13. Evaluation of Services	9
14. Reporting Procedures.....	10
15. Proponent	10

ER 1110-1-8169
01 Oct 2018

APPENDIXES

APPENDIX A Organizational Structure A-1
APPENDIX B Technical Competencies B-1
GLOSSARY Glossary-1

LIST OF FIGURES

Figure A-1. CEHNC MCX Organizational Structure. A-1

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1. Purpose. This regulation sets forth the mission, organization, authority, policy and roles and responsibilities of the U.S. Army Corps of Engineers (USACE) Facilities Explosives Safety Mandatory Center of Expertise (FES MCX). It also provides guidance and procedures by which the USACE Commands and other Department of Defense (DOD) and Government agencies can obtain services from the FES MCX. The FES MCX is located within the U.S. Army Engineering and Support Center (CEHNC) located in Huntsville, Al.
2. Applicability. This regulation applies to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements, divisions, districts, laboratories, and field operations.
3. Distribution Statement. Approved for public release; distribution is unlimited.
4. References.
 - a. Army Regulation 385-10, Safety, The Army Safety Program.
 - b. Army Regulation 421-1, Facilities Management, Army Facility Management.
 - c. Department of Army Pamphlet 385-64, Ammunition and Explosives Safety Standard.
 - d. Department of Defense 6055.09-M, Ammunition and Explosives Safety Standards.
 - e. Engineer Manual (EM) 385-1-1, Safety-Safety and Health Requirement Manual.
 - f. EM 385-1-97, Explosives Safety and Health Requirements Manual.
 - g. Engineer Regulation (ER) 1110-1-12, Engineering and Design Quality Management.
 - h. ER 1110-1-8158, Engineering and Design, Corps-wide Centers of Expertise Program.

5. Establishment. Projects involving the design, construction, or modification of facilities that manufacture, store, handle, maintain, develop, demilitarize, test, or dispose of ammunition or explosives (AE), and facilities within the explosives safety quantity distances (ESQD) of AE facilities require the involvement of subject matter experts in explosives safety. HQUSACE established the FES MCX in 2017 in response to concerns that this specialized area of expertise is not thoroughly understood by design professionals whose areas of responsibility are mostly conventional design and construction. FES projects require approval at the Military Service and the Department of Defense levels before construction can begin. Mandatory Center of Expertise (MCX) participation will promote successful and efficient approval of such projects. The term "Military Service-level explosives safety centers," which is used throughout this document, applies to the organizations listed in 'a-d':

- a. Army: U.S. Army Technical Center for Explosives Safety.
- b. Air Force: U.S. Air Force Safety Center.
- c. Navy: U.S. Naval Ordnance Safety and Security Activity.
- d. Marines: U.S. Marine Corps System Command Program Manager for Ammunitions.
- e. The DOD proponent for explosives safety approval is the Department of Defense Explosives Safety Board (DDESB).
- f. MCX Area of Responsibility Clarifications: To aid the USACE Districts in determining the appropriate mandatory of expertise to use for support, the following clarifications are provided.

(1) Projects involving Antiterrorism and Force Protection design or mitigation will use the U.S. Army Corps of Engineers Protective Design Center MCX.

(2) Projects involving environmental response actions (Hazardous, Toxic, and Radioactive Waste [HTRW], Containerized Hazardous, Toxic, and Radioactive Waste [CON/HTRW], Building Demolition and Debris Removal [BD/DR]) and/or military munitions response program (MMRP) actions will use the U.S. Army Corps of Engineers Environmental and Munitions Mandatory Center of Expertise (EM CX) as required by ER 385-1-95 and EM 385-1-97. These regulations apply to all USACE personnel performing projects where munitions and explosives of concern (MEC), including chemical warfare materiel (CWM), are known or suspected to be present and/or when they are encountered. This includes Military Program and Civil Works construction and dredging projects, including International and Interagency Services (IIS) projects, and Environmental Munitions response projects such as for Formerly Used Defense Sites, Base Realignment and Closure, and active service component MMRP. This includes review and approval of required explosives safety submissions in support of clearance activities of a construction

footprint. The EM CX's roles and responsibilities are set forth in ER 10-1-50 and included on the Technical Excellence Network website (https://apps.usace.army.mil/sites/TEN/Lists/coe/HQ_Official.aspx).

(3) Projects involving environmental response actions (HTRW, CON/HTRW, BD/DR) and/or MMRP actions will use the Military Munitions Design Centers as required by Interim Guidance Document 15-01 (ER 1110-1-8153). These regulations apply to all USACE personnel performing projects where MEC, including CWM, are known or suspected to be present and/or when they are encountered.

g. **Storage of Explosives Used in Blasting Operations:** The USACE has occasions where blasting operations are utilized in support of construction and demolition/implosion activities. The Districts will ensure that related qualified contractors demonstrate recent specialized experience before entering in a contractual agreement with them. The entirety of the contractor's blasting plan (contractual submittal) is not within the FES-MCX review scope. However, on-site storage of explosives requires an approved Explosive Safety Site Plan (ESSP).

h. For the occasion where the contractor is storing explosives as part of the method of operations, MCX approval of the ESSP is required. If the project is occurring on a military installation, the ESSP will also require review and approval by the Military Service-level explosives safety organization and the DDESB. If the project is not on a military installation, review and approval by Military Service-level explosives safety organization and the DDESB are not required.

6. **Mission.** The FES MCX will provide expert explosives safety technical support services to all HQUSACE elements, divisions, districts, laboratories, field operations, Army, and other DOD and non-DOD federal agencies. The FES MCX will also provide technical support to foreign, state, and local governments and authorities when coordinated with and authorized by HQUSACE through an IIS Agreement.

7. **Organization.** The FES MCX directly reports to the CEHNC Engineering Director. The Engineering Director and the FES MCX team are located in Huntsville, AL. The FES MCX consists of a program manager with three functional technical teams. The team members are housed in their respective discipline branches (Structural, Mechanical, Electrical, Civil Site, Operations) within the Engineering Directorate. See Appendix A for the organizational chart.

8. **Technical Competencies.** Technical competencies of the FES MCX are shown in Appendix B.

9. **Roles and Responsibilities.** The roles and responsibilities of USACE components are listed below.

a. HQUSACE. The HQUSACE Engineering and Construction Division (CECW-EC) is the proponent organization for the FES MCX. The HQUSACE proponent will effectively coordinate with the CEHNC MCX program manager to provide overall technical monitoring of the MCX. The HQUSACE proponent will ensure detailed information related to the FES MCX, including this Engineering Regulation, are published on the Technical Excellence Network website. HQUSACE will ensure that adequate central funding is made available for the mandatory and voluntary centrally funded services listed in Paragraphs 10 and 11.

b. USACE Major Support Commands (MSCs) will ensure appropriate use of the MCX to obtain quality control according to ER 1110-1-12 and to monitor the usage of the MCX in the design and construction activities of their districts according to ER 1110-1-8158.

c. Districts.

(1) Districts are responsible for ensuring that explosives safety requirements are incorporated in projects within their geographical areas and for requesting support from the FES MCX according to ER 1110-1-8158. Projects involving the design, construction, or modification of facilities that manufacture, store, handle, maintain, develop, demilitarize, test, or dispose of ammunition or explosives, and facilities within the explosives safety quantity distances of AE facilities require the involvement of FES MCX subject matter experts in explosives safety.

(a) For projects outside of the United States, comply with the most stringent DOD or Host Nation explosives safety standards unless standards applicability is mandated by international agreement.

(b) For Foreign Military Sales, comply with DOD explosives safety standards unless standards' applicability is mandated by international agreement.

(2) Districts will include statements in their project documentation, signed by the chief of the Engineering function, certifying that MCX has been appropriately used in the planning, design, and execution of their projects.

(3) Districts will provide adequate funds for all reimbursable services rendered by the MCX.

(4) Districts will keep the FES MCX advised of all applicable project developments to enable the MCX to manage their workload more effectively.

(5) Districts will ensure that ESSP's for the project are prepared and approved by the Military Service-level explosives safety centers and DDESB before construction begins. The approvals will be obtained in writing and included in the project file. The project schedule should allow for at least 180 days for the approval of the ESSP by the Military

Service-level explosives safety center and the DDESB. If the ESSP is not developed by the USACE customer or installation personnel (safety office or tenant), the project manager will ensure that an ESSP is developed and approved before beginning construction. In some instances, it may fall on the USACE District to provide resources (through in-house personnel, USACE SMEs, or private industry professionals) to initiate and develop the ESSP.

d. CEHNC will maintain and support the FES MCX. This includes the provision of sufficient training opportunities and funding to enable assigned personnel to maintain state-of-the-art proficiency in explosives safety.

e. FES MCX.

(1) FES MCX will provide personnel to participate in DOD and Army explosives safety technical working groups, science panels and councils.

(2) FES MCX will provide expert explosives safety technical support services to all HQUSACE elements, divisions, districts, laboratories, field operations, Army, and other DOD and non-DOD Federal agencies. In this capacity, FES MCX will:

(a) Function as subject matter expert in all areas related to facilities explosives safety.

(b) Perform mandatory review of planning and design documents for Corps projects involving the design, construction, or modification of facilities that manufacture, store, handle, maintain, develop, demilitarize, test, or dispose of ammunition or explosives, and facilities within the ESQD of AE facilities.

(3) FES MCX will provide explosives safety technical support to foreign, state, and local governments and authorities.

(4) FES MCX will maintain state-of-the-art technical expertise in areas of explosives safety including, but not limited to:

(a) The knowledge of explosives safety criteria (DOD, Military Service-level) for accidental and intentional detonations.

(b) The ability to determine primary fragmentation characteristics of single and multiple ammunition and explosives items.

(c) The ability to determine secondary debris characteristics of equipment and building components.

(d) The ability to determine permissible exposures and levels of protection required by DOD and Military Service-level standards.

- (e) The ability to perform explosives safety quantity distance analyses to determine quantity of AE allowed at potential explosion sites.
 - (f) The ability to determine blast overpressure effects and resulting structural loads.
 - (g) The ability to design and analyze methods of mitigation of explosion effects.
 - (h) The ability to design and analyze protective construction, including proficiency in the dynamic analysis of structures subjected to explosion effects.
 - (i) The ability to understand the more stringent safety measures regarding lightning protection and the other different types of grounding systems found and required in explosives facilities.
 - (j) The ability to perform lightning protection system analysis, design, and field inspection, including zone of protection and side flash calculations.
 - (k) The ability to design and analyze munitions and ammunition storage, maintenance, and production facilities.
 - (l) The ability to design to provide total containment of explosion effects.
- (5) FES MCX will serve as the HQUSACE point of contact for explosives safety and assist in related policy formulation, program guidance, technology transfer, research and development monitoring, specialized training, and interagency coordination.
- (6) FES MCX will serve as the USACE liaison to the Military Service-level explosives safety centers and the DDESB.
- (7) FES MCX will provide explosives safety technical approval to USACE entities for Foreign Military Sales projects not requiring Military Service-level or DDESB approval.

10. Mandatory Services. ER 1110-1-8158 requires that mandatory services be established and documented in the MCX ER. The services listed in this paragraph are mandatory and USACE entities will request the FES MCX support. Mandatory Services may be executed using either centrally provided funds provided by higher headquarters or reimbursable funds provided by the entity that requests the services according to the following:

a. Centrally funded mandatory services. (HQUSACE funded)

- (1) Review or development of DOD, Military Service-level, and USACE explosives safety documents when requested by HQUSACE.

(2) Review the explosives safety aspects of programming document DD Form 1391 during the USACE review and certification stage for all projects involving the design, construction, or modification of facilities that manufacture, store, handle, maintain, develop, demilitarize, test, or dispose of ammunition or explosives, and facilities within the explosives safety quantity distances of AE facilities.

b. Reimbursable mandatory services. Applicable to all USACE projects involving the manufacture, storage, handling, maintenance, development, demilitarization, testing, or disposal of ammunition or explosives.

(1) Review areas related to explosives safety for projects involving the design, construction, or modification of facilities that manufacture, store, handle, maintain, develop, demilitarize, test, or dispose of ammunition or explosives, and facilities within the explosives safety quantity distances of AE facilities.

(2) Participate in planning and design, procurement and construction stages of projects to ensure that explosives safety requirements are included.

(a) Involvement of the MCX at the beginning of the project is crucial for successful execution. MCX will provide guidance related to explosives safety quantity distance footprint, impact to facilities and infrastructure within the ESQD footprint and surrounding area, and the need for protective construction to mitigate explosion effects.

(b) Review the design submittals to ensure that adequate details are provided accurately to facilitate review and approval from the Military Service-level safety centers and the DDESB.

(c) Support the district and resident engineer offices by providing construction support. Review submittals related to explosives safety components of the project, such as lightning protection systems, grounding and bonding systems, fire protection, heating and air systems, and protective construction (hardened) structures used to mitigate explosion effects. A list of the explosives safety -related submittals will be determined by the resident engineer and the MCX before start of construction.

(3) Review project's explosives safety site plan.

(4) Review all variances from explosives safety requirements and the associated explosives safety risk assessments.

11. Voluntary Services. Voluntary services are those that do not fall under the mandatory services required of the FES MCX, but that the FES MCX may do upon request. They include those that can be done on a non-reimbursable basis using centrally provided funds provided by higher headquarters or on a reimbursable basis using funds provided by the elements that request the services:

a. Centrally funded voluntary services. (HQUSACE funded)

(1) Participation in DOD or Military Service-level explosives safety councils and technical working groups when requested by HQUSACE.

(2) Short term (up to 4 hrs.) explosives safety consultation to USACE elements.

b. Reimbursable voluntary services. Customers include, but are not limited to, Corps elements, Military Service-level safety centers, other DOD departments, non-DOD Federal agencies, and Federal, state, and local governmental agencies or authorities. The FES MCX will provide the following services on a reimbursable basis:

(1) Develop project explosives safety site plan per Military Service-level and DOD explosives safety requirements.

(2) Develop test plans and participate in explosion effects testing.

(3) Provide guidance for and/or perform field/site investigations to determine in situ conditions of explosives safety features of facilities and storage areas that are used for explosives operations, testing, or storage.

(4) Determine primary fragmentation characteristics of single and multiple ammunition and explosives items.

(5) Determine secondary debris characteristics of equipment and building components.

(6) Determine explosion effects (overpressure, fragmentation/debris, and thermal) and develop methods of mitigation.

(7) Design and analyze protective construction to mitigate explosion effects.

(8) Design and analyze lightning protection systems, including zone of protection and side flash calculation.

(9) Perform explosives safety quantity distance analysis.

(10) Perform explosives safety risk assessments.

(11) Design and analyze munitions and ammunition storage, maintenance, production, and testing facilities per DOD and Military Service-level explosives safety criteria.

(12) Design structures to provide total containment of explosion effects.

12. Method of Operation.

a. General. FES MCX will evaluate requests from customers and assign engineering functions in a way that maximizes resources while providing the necessary level of expertise to perform the task.

b. Request for Services. Requests for explosives safety-related services will be submitted to the FES MCX by telephone, e-mail, or letter. Informal communication is encouraged; however, before any reimbursable work begins, the FES MCX and requesting agency will develop a mutually acceptable scope of work, schedule, and budget estimate.

c. Funding for Services. Services will most often be provided on a cost reimbursable arrangement. FES MCX will develop a cost estimate based on the agreed upon scope of work between the MCX and requesting entity. The cost estimate will be revised to account for agreed upon changes in scope services. For USACE support, labor will be provided to the MCX using labor cross charge codes; a Military Interdepartmental Purchase Request will be used if travel is required.

d. Quality Management and Control. FES MCX services will be according to the principles set forth in ER 1110-1-12. Internal independent technical reviews by senior level subject matter experts will be conducted on deliverables. For completeness, the customer's involvement in the review of draft versions of the deliverables will be encouraged.

e. Support to Defense Departments and Agencies and Non-Department of Defense Agencies. The MCX will provide explosives safety-related specialized support only. This support includes, but is not limited to: requests for services such as explosives safety site plans, explosion effects studies, explosives safety risk assessments, explosives safety quantity distance analyses, explosives safety lightning protection system and grounding and bounding design and assessments, explosion effects testing, primary fragmentation analyses, secondary debris studies, protective construction designs and analyses, explosives safety technical assistance, accidental explosion damage assessments, and other explosives safety-related functions that are inherent functions of the FES MCX. A decision memorandum approved by HQUSACE is not required before accepting the work. The MCX will notify the USACE geographic district of the effort if military construction (new or renovation) is involved.

f. Conflict Resolution. Conflicts or differences should be resolved between FES MCX and the USACE command. If the conflict or difference cannot be resolved by mutual agreement, it should be elevated to the Command's MSC for resolution first, then to CECW-EC if requested by either the FES MCX or the MSC.

13. Evaluation of Services. FES MCX will use the CEHNC external customer survey program. Customers will be sent an annual customer survey to gather feedback on

ER 1110-1-8169
01 Oct 2018

efficiency of process, quality of product delivered, timeliness, communication, and cost. In addition, FES MCX will participate in the Internal Customer Evaluation program, which allows real time feedback.

14. Reporting Procedures. The FES MCX will prepare an annual report for the HQUSACE proponent. The report will include a summary of support provided to USACE for centrally and reimbursable funded tasks and will address metrics established with HQUSACE proponent. The report will be on a fiscal year basis and will be completed and furnished to the proponent no later than 90 days after the end of the fiscal year. If requested by the proponent during the year, the FES MCX will provide an in-progress review giving current status of the support. Normal day-to-day operation and reporting will be on an informal, as-needed, basis.

15. Proponent. The proponent for the FES MCX is CECW-EC.

FOR THE COMMANDER:

2 Appendixes
Appendix A - Organizational Structure
Appendix B - Technical Competencies



KIRK E. GIBBS
COL, EN
Chief of Staff

APPENDIX A

Organizational Structure

A-1. Staffing within the Engineering Directorate, in Huntsville, Al. provides an organizational structure consisting of three multidiscipline functional teams to execute the FES MCX roles and responsibilities. The team consists of Structural, Electrical, Mechanical, and Fire Protection Engineers.

a. The Explosives Effects and Special Studies Team has responsibilities for calculating explosion effects including the effects of primary fragmentation, secondary (i.e., debris) fragmentation, and overpressure from a detonation.

b. The Protective Construction Team has responsibilities for reviewing, analyzing, and designing structures to achieve personnel protection, to protect facilities and equipment, and to prevent propagation of accidental explosions.

c. The Explosives Safety Site Plans Team has responsibilities for reviewing and developing ESSPs.

A-2. Figure A-1 shows that proposed organizational structure for the MCX.

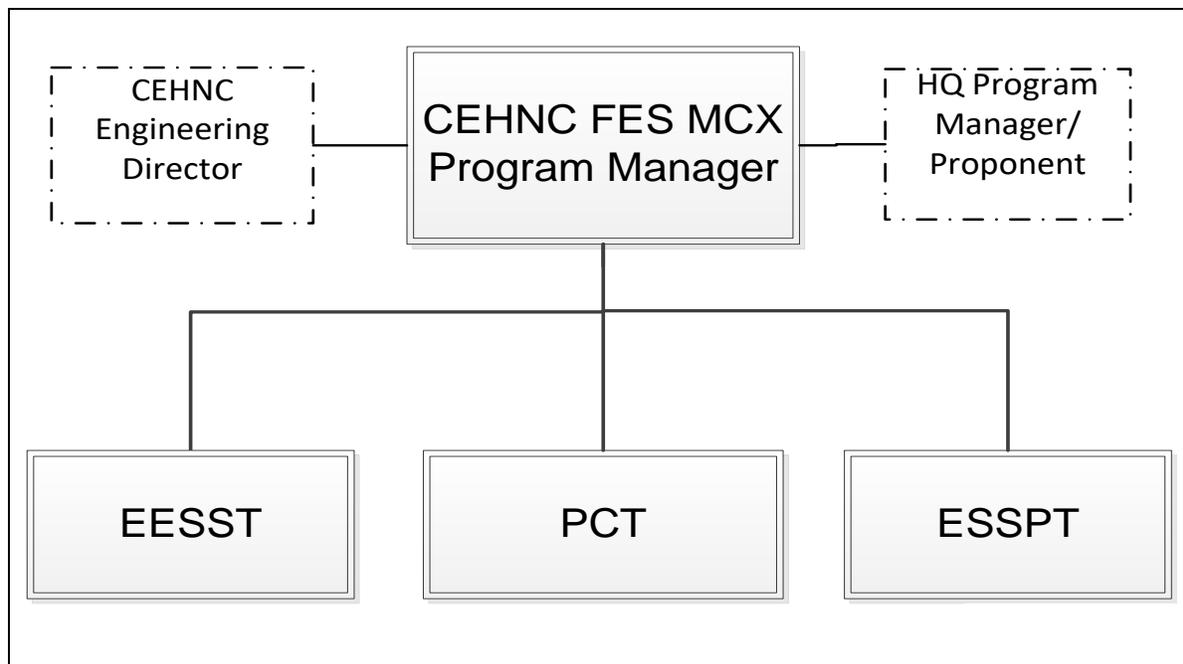


Figure A-1. CEHNC FES MCX Organizational Structure.

ER 1110-1-8169
01 Oct 2018

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APPENDIX B

Technical Competencies

B-1. Providing explosives safety to DOD assets requires personnel with overall and in-depth understanding of explosion effects on buildings, equipment, and personnel. Technical Competencies (expert level) required for personnel serving as the USACE Facilities Explosives Safety MCX are:

- a. The knowledge of explosives safety criteria (DOD, Military Service-level) for accidental and intentional (testing) detonations.
- b. The ability to determine primary fragmentation characteristics of single and multiple ammunition and explosives items.
- c. The ability to determine secondary debris characteristics of equipment and building components.
- d. The ability to determine permissible exposures and levels of protection required by DOD and Military Service-level standards.
- e. The ability to perform explosives safety quantity distance analysis to determine quantity of AE allowed at potential explosion sites.
- f. The ability to determine blast overpressure effects and resulting structural loads.
- g. The ability to design and analyze methods of mitigation of explosion effects.
- h. The ability to design and analyze protective construction, including proficiency in the dynamic analysis of structures subjected to explosion effects.
- i. An understanding of the more stringent safety measures regarding lightning protection and the other different types of grounding systems found and required in explosives facilities.
- j. The ability to perform lightning protection system analysis, design and field inspection, including zone of protection and side flash calculations.
- k. The ability to design and analyze munitions and ammunition storage, maintenance, and production facilities.
- l. The ability to design to provide total containment of explosives effects.

ER 1110-1-8169
01 Oct 2018

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GLOSSARY

Term	Definition
AE	Ammunition and Explosives
BD/DR	Building Demolition and Debris Removal
CECW-EC	HQUSACE Engineering and Construction Division
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CON/HTRW	Containerized Hazardous, Toxic, and Radioactive Waste
CWM	Chemical Warfare Materiel
DDESB	Department of Defense Explosives Safety Board
DOD	U.S. Department of Defense
EM	Engineer Manual
EM CX	Environmental and Munitions Mandatory Center of Expertise
ER	Engineer Regulation
ESQD	Explosives Safety Quantity Distances
ESSP	Explosives Safety Site Plan
FES MCX	Facilities Explosives Safety Mandatory Center of Expertise
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HTRW	Hazardous, Toxic, and Radioactive Waste
IIS	Interagency and International Services
MCX	Mandatory Center of Expertise
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MSC	Major Subordinate Command
USACE	U.S. Army Corps of Engineers

ER 1110-1-8169
01 Oct 2018

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