

CJCSI 3160.01B

11 December 2015

**NO-STRIKE AND THE  
COLLATERAL DAMAGE  
ESTIMATION METHODOLOGY**



**JOINT STAFF**

**WASHINGTON, D.C. 20318**

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**

(INTENTIONALLY BLANK)

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**



# UNCLASSIFIED CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

J-2  
DISTRIBUTION: A, B, C, S

CJCSI 3160.01B  
11 December 2015

## NO-STRIKE AND THE COLLATERAL DAMAGE ESTIMATION METHODOLOGY

Reference(s): See Enclosure F for References

1. (U) Purpose. The purpose of this instruction is to document the Department of Defense (DoD) policy governing the No-strike process, management of No-strike entities (NSEs), treatment of collateral entities, and the logic, processes, and procedures of the collateral damage estimation methodology (CDM).
2. (U) Superseded/Cancellation. CJCSI 3160.01A, 12 October 2012, "No-Strike and the Collateral Damage Estimation Methodology" is superseded.
3. (U) Applicability. This instruction applies to the Joint Staff, Services, Combatant Commands (CCMDs), DoD combat support agencies (CSAs), and joint activities.
4. (U) Policy. See Enclosures A through E, which establish DoD policy governing the No-strike process; management of NSEs; treatment of collateral objects; and the logic, processes, and procedures of the CDM.
5. (U) Definitions. See Glossary.
6. (U) Responsibilities. See Enclosure A.
7. (U) Summary of Changes. Changes primarily encompass:
  - a. (U) Reorganization of the document to consolidate policy categories in response to user requests to improve readability.
  - b. (U) Multiple technical updates to the methodology incorporating lessons learned from Operations IRAQI FREEDOM, ENDURING FREEDOM, ODYSSEY DAWN, UNIFIED PROTECTOR, and INHERENT RESOLVE.

UNCLASSIFIED

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

- c. (U) Consistency in the use of technical jargon is improved.
  - d. (U) Clarification of training and support responsibilities.
  - e. (U) Expansion of language to be more inclusive of information related capabilities.
  - f. (U) The handling of involuntary and unwitting human shields is modified to allow for weapon effect mitigation considerations.
  - g. (U) The Category I and II No-strike Entity Tables are updated.
  - h. (U) Delivery heading mitigation statements derived solely from the CDM are classified as recommendations; heading recommendations are optional remarks except where required by weaponeering solutions.
  - i. (U) The CDE Level 2 procedures have been re-written to remove minimum target size analysis.
  - j. (U) The first question in "The Five Basic Questions of the CDM" has been re-written to reflect positive identification is not primarily the responsibility of the CDE analyst.
  - k. (U) Procedures for analyzing Chemical, Biological, Radiological (CBR) plume and environmental health hazards now include considerations for weapon effect mitigation.
  - l. (U) For large dual-use facilities, new procedures are added for calculating a percentage affected in the casualty estimation.
  - m. (U) The terms "qualified" and "certified" as used to describe CDE training accomplishments are swapped in response to community requests for standardization.
8. (U) Releasability. ~~LIMITED. (NOT APPROVED FOR PUBLIC RELEASE)~~ This directive is approved for .mil/.gov access only on NIPRNET. DOD Components (to include the Combatant Commands) and other Federal agencies may obtain copies of this directive through controlled access at [ [http://www.dtic.mil/cjcs\\_directives/](http://www.dtic.mil/cjcs_directives/) ]. DOD Components may also obtain access via the SIPR Directives Electronic Library Websites. Combatant Command Foreign Disclosure Officers are authorized to release this instruction to foreign governments to support the planning of or execution of combined/

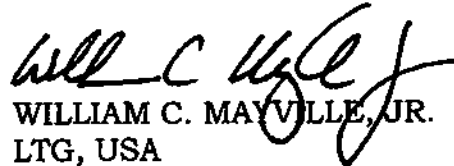
# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

allied operations. These foreign representatives will not be authorized to further disseminate the instruction.

9. (U) Effective Date. This INSTRUCTION is effective upon receipt.

For the Chairman of the Joint Chiefs of Staff:



WILLIAM C. MAYVILLE, JR.  
LTG, USA  
Director, Joint Staff

## Enclosures

- A - Responsibilities
- B - General Guidance for No-Strike Entities and Collateral Concerns
- C - The No-Strike Process
- D - Collateral Damage Estimation (CDE) Policy and Guidance
- E - Joint Collateral Damage Estimation Methodology (CDM)
- F - References
- GL - Glossary

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

**UNCLASSIFIED**

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## DISTRIBUTION

Distribution A, B, C, plus the following:

	<u>Copies</u>
Secretary of State .....	2
Secretary of Defense .....	2
Director of Central Intelligence .....	2
Office of the Chairman, JCS, Legal Counsel .....	2

“OPR for the subject directive has chosen electronic distribution to the above organizations via E-mail. The Joint Staff Information Management Division has responsibility for publishing the subject directive to the SIPR and NIPR Joint Electronic Library Websites.”

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

**UNCLASSIFIED**

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## TABLE OF CONTENTS

	Page
ENCLOSURE A -- RESPONSIBILITIES.....	A-1
Overview .....	A-1
Joint Staff Targeting.....	A-1
Joint Technical Coordinating Group/Munitions Effectiveness.....	A-1
Joint Staff/J-7 Joint Targeting School (JTS) .....	A-2
Combatant Commands (CCMDs) .....	A-3
Services .....	A-5
DoD Combat Support Agencies (CSAs)/Service Intelligence Production or Targeting Centers .....	A-5
Other Organizations .....	A-7
Inherent Responsibility .....	A-7
ENCLOSURE B -- GENERAL GUIDANCE FOR NO-STRIKE ENTITIES (NSEs) AND COLLATERAL CONCERNS .....	B-1
Introduction.....	B-1
General Guidance .....	B-1
No-Strike Entities (NSEs).....	B-2
Dual-use Entities .....	B-4
Human Shields .....	B-4
APPENDIX -- INFORMATION RELATED CAPABILITY COLLATERAL DAMAGE ESTIMATION (CDE) POLICY AND GUIDANCE .....	B-A-1
ENCLOSURE C -- THE NO-STRIKE PROCESS.....	C-1
Introduction.....	C-1
No-Strike Entity (NSE) Identification, Characterization, and Nomination .....	C-1
No-Strike List (NSL) Generation and Maintenance .....	C-2
No-Strike Entity (NSE) and No-Strike List (NSL) Verification .....	C-11
No-Strike List (NSL) Coordination and Approval.....	C-12
No-Strike List (NSL) Dissemination.....	C-12
No-Strike Entity (NSE) Change of Status .....	C-13
No-Strike List (NSL) and Target Engagement .....	C-14
Follow-on Operations .....	C-14
APPENDIX -- DATABASE DEVELOPMENT.....	C-A-1
ENCLOSURE D -- COLLATERAL DAMAGE ESTIMATION (CDE) POLICY AND GUIDANCE .....	
Introduction.....	D-1
General Guidance .....	D-1

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

Collateral Damage Estimation Methodology (CDM) and Collateral Objects.....	D-4
Mitigation Techniques .....	D-7
Collateral Damage Estimation Methodology (CDM) Limitations and Exclusions .....	D-10
<b>ENCLOSURE E -- JOINT COLLATERAL DAMAGE ESTIMATION METHODOLOGY (CDM) .....</b>	<b>E-1</b>
Collateral Damage Estimation Methodology (CDM) Overview.....	E-1
The Five Basic Questions of the Collateral Damage Estimation Methodology (CDM) .....	E-8
Field Collateral Damage Estimation (CDE).....	E-8
<b>APPENDIX A -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 1 INITIAL ANALYSIS .....</b>	<b>E-A-1</b>
<b>APPENDIX B -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 2 PRECISION-GUIDED MUNITIONS (PGM) GENERAL ANALYSIS .....</b>	<b>E-B-1</b>
<b>APPENDIX C -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 3 WEAPONEERING ANALYSIS.....</b>	<b>E-C-1</b>
<b>APPENDIX D -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 4 REFINED ANALYSIS.....</b>	<b>E-D-1</b>
<b>APPENDIX E -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 5 CASUALTY ANALYSIS .....</b>	<b>E-E-1</b>
<b>APPENDIX F -- COLLATERAL DAMAGE ESTIMATION METHODOLOGY (CDM) QUICK GUIDE.....</b>	<b>E-F-1</b>
<b>APPENDIX G -- COLLATERAL EFFECTS RADIUS (CER) REFERENCE TABLE SUMMARY .....</b>	<b>E-G-1</b>
<b>APPENDIX H -- COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 5 POPULATION DENSITY TABLE AND CE WORKSHEET .....</b>	<b>E-H-1</b>
<b>APPENDIX I -- JOINT COLLATERAL DAMAGE ESTIMATION (CDE) PROGRAM STANDARDS .....</b>	<b>E-I-1</b>
<b>APPENDIX J -- COLLATERAL DAMAGE ESTIMATION (CDE) JOINT MISSION TASK LIST (CDE-JMTL) .....</b>	<b>E-J-1</b>
<b>ENCLOSURE F -- REFERENCES.....</b>	<b>F-1</b>
<b>GLOSSARY .....</b>	<b>GL-1</b>
<b>PART I -- ABBREVIATIONS AND ACRONYMS .....</b>	<b>GL-1</b>
<b>PART II -- TERMS AND DEFINITIONS.....</b>	<b>GL-5</b>

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## LIST OF FIGURES

1. Risk and the Collateral Damage Estimation Methodology ..... E-2
2. CER/CHA Relationship ..... E-5
3. Dual-Use Percentage Affected Example..... E-E-3

## LIST OF TABLES

1. Category I NSE Descriptions..... C-3
2. Category I Collateral Objects ..... C-5
3. Category II NSE Descriptions ..... C-6
4. Category II Collateral Objects ..... C-10
5. Core No-Strike List Category Codes ..... C-A-1
6. Urban Area Priority List ..... C-A-2
7. Sources for Deriving Positional Data..... C-A-3
8. CDM Mitigation Techniques ..... D-7
9. Casualty Factor for PGM ..... E-E-4
10. Casualty Factor for ASUGM..... E-E-5
11. Casualty Factor for SSBM ..... E-E-6

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

**UNCLASSIFIED**

ENCLOSURE A

(U) RESPONSIBILITIES

1. (U) Overview. This enclosure delineates responsibilities for the many organizations that execute and support the No-strike guidance and CDM. The Joint Staff Director for Intelligence (J-2) Deputy Directorate for Crisis and Current Operations (Joint Staff/J-23) is the lead agent for updates or changes to this instruction.
  
2. (U) Joint Staff Targeting. The Joint Staff/J23-4 Targeting Division, here after referred to as Joint Staff Targeting, is responsible for the development of No-Strike and Collateral Damage Estimation (CDE) policy and guidance for the CJCS. Joint Staff Targeting fulfills this role in collaboration with CCMDs, designated service representatives, Combat Support Agencies (CSAs), and the Intelligence Community (IC). The following are Joint Staff Targeting roles and responsibilities specific to No-Strike and the CDM:
  - a. (U) Develop joint No-strike, collateral effects analysis and CDE policy and guidance.
  
  - b. (U) Coordinate with the CCMDs, Services, CSAs, and the Joint Technical Coordinating Group for Munitions Effectiveness (JTTCG/ME) to identify operational requirements that provide the framework for the CDM.
  
  - c. (U) Assist in the development of Service or CCMD collateral effects analysis and CDE programs.
  
  - d. (U) Provide oversight of population density reference tables to facilitate IC support and ensure their standardized production and use.
  
  - e. (U) Review and coordinate CDE automation requirements. Provide oversight of automated tool development, in coordination with JTTCG/ME, to ensure policy, training, and tool automation is synchronized.
  
  - f. (U) Notify DoD components when new collateral effects radius (CER) tables are produced.
  
3. (U) Joint Technical Coordinating Group/Munitions Effectiveness. The JTTCG/ME is a joint organization chartered under the auspices of the Services' logistics commands. It directs working groups that focus on specific aspects of weaponing, weapon effects, and collateral damage. The following are

JTCG/ME roles and responsibilities specific to the CDM:

a. (U) Develop and publish weapons effectiveness information for nonnuclear weapons. The CER Reference Tables are the foundation for the CDM. They are developed, maintained, and distributed by JTCG/ME, in coordination with Joint Staff Targeting.

b. (U) Produce CER Reference Tables separate from this instruction as new weapons data becomes available.

c. (U) Contribute technical updates to this instruction concurrent with the development and release of new weapons effects data and products.

d. (U) Contribute updates to this instruction concurrent with the development and refinement of mitigation techniques authorized for use in the conduct of CDE.

e. (U) Validate tools, sources, and methods used to display or calculate the CER for the CER reference tables and weapon effectiveness data. This includes accrediting tools designed to estimate shielding effects.<sup>1</sup>

4. (U) Joint Staff/J-7 Joint Targeting School (JTS). The JTS provides joint targeting training for personnel assigned targeting duties at Unified Commands, the Joint Staff, CSAs, and Services. As part of its curriculum, JTS teaches CDM. The following are JTS roles and responsibilities specific to CDM:

a. (U) Provide CDE qualification training for personnel assigned to a position or billet performing CDE. Training of additional personnel is conducted on a space available basis. CDE qualification will meet the standards prescribed in Appendix I to Enclosure E, Joint CDE Program Standards (JCPS).

b. (U) Maintain at least one standardization instructor as the program manager capable of qualifying instructors.

c. (U) Provide standardization, in concert with Service/functional subject matter experts, via audit and accreditation of Service and CCMD CDE programs when directed by Joint Staff Targeting, in accordance with the JCPS.

d. (U) Maintain and make available to Service and CCMD CDE programs a current set of CDE training courseware and a master question file. The JTS

---

<sup>1</sup> Common analytical tools performing line-of-sight analysis may not accurately replicate weapon and fuzing effects. JTCG/ME accreditation will ensure weapon and fuzing effects are accounted for with the greatest accuracy available.

11 December 2015

developed courseware will be the minimum standard program of instruction (POI). JTS accredited organizations may add to the JTS POI to enhance training, but may not subtract material. The JTS master question file, developed in coordination with the Services and CCMDs, will be the authoritative source for Service and CCMD CDE qualification program academic evaluations.

e. (U) Keep a record of personnel who graduate from JTS qualified in CDE. JTS will also update individual's initial qualification and track instructors via the Joint Staff Targeting Secret Internet Protocol Router Network (SIPRNET) SharePoint site CDE Registry.

f. (U) Ensure CDE programs comply with the JCPS.

5. (U) Combatant Commands (CCMDs). Combatant commanders (CCDRs) must apply the CDM during the evaluation of proportionality and military necessity for target engagements, considering the mission specific rules of engagement (ROE) and higher commander's guidance during the planning and conduct of operations. The following are CCMD roles and responsibilities specific to No-Strike and the CDM:

a. (U) Establish positive identification (PID) processes, procedures, and requirements for use during target development and target engagement.

b. (U) Promulgate CDE guidance based on theater-specific ROE and targeting guidance.

c. (U) Identify positions requiring CDE training and certification on the joint manning document.

d. (U) Ensure personnel assigned to a CCMD position or billet that requires them to conduct CDE are qualified and certified as CDE analysts, and understand theater-specific ROE and targeting tactics, techniques, and procedures. Update analysts' qualification, certification, and instructors' records on the Joint Staff Targeting SIPRNET SharePoint site CDE Registry. CCMDs may accept certification by the CCMD's respective Service Components.

e. (U) Send a letter of intent to Joint Staff Targeting in accordance with (IAW) JCPS if desiring to establish a CDE program. JTS will initially qualify the instructors and accredit the program via an audit of the program. Requesting organizations are responsible for funding their courses to include the training of their instructors and the accreditation of the program.

- f. (U) Ensure CDE programs comply with guidance issued in this document.
- g. (U) Identify a CDE program manager in writing to Joint Staff Targeting.
- h. ~~(U//FOUO)~~ Prioritize requirements for population density tables with Oak Ridge National Laboratory (ORNL).
- i. (U) Present the appropriate information as directed by this instruction and CJCSI 3122.06, Sensitive Target Approval and Review (STAR) Process (see Enclosure F, reference a) to support the evaluation of proportionality for target engagement decisions.
- j. (U) Geographic Combatant Commands (CCMDs). Supported by the IC, geographic CCDRs are responsible for establishing, maintaining, and disseminating as required a list of NSEs (known as the No-Strike List (NSL)) for assigned areas of operation. Geographic CCMDs are also responsible for those countries within their Unified Command Plan assigned area of responsibility (AOR) for which Guidance for Employment of the Force documentation exists (formerly known as Contingency Planning Guidance) or Joint Strategic Capabilities Plan (JSCP) directed plans and/or operation orders (OPORDs).<sup>2</sup>
- (1) (U) The geographic CDR, as the approving authority for the NSL, should designate a single No-Strike Coordinator to manage this process (see Enclosure C). NSLs must reside in Modernized Integrated Database (MIDB).
- (2) (U) Ensure personnel assigned to a geographic CCMD position or billet required to conduct CDE are qualified and certified as CDE analysts, and understand theater-specific ROE and targeting tactics, techniques, and procedures.
- k. (U) Functional Combatant Commands (CCMDs). Functional CCMDs with worldwide responsibilities are responsible for coordinating identified No-strike entities with relevant geographic CCMDs.
- (1) (U) Functional CCMDs may develop and maintain NSLs for NSEs, which have "Worldwide" identified as the location in the MIDB record for the purposes of preventing LOW violation and identifying strategic risk.
- (2) (U) It is critical for the functional CCMD to aggressively coordinate with the supporting geographic CCMDs to ensure NSLs for countries of interest

---

<sup>2</sup> Enclosure F of the JSCP provides Intercommand Targeting Guidance.

are current and valid (see Enclosure C).

(3) (U) Ensure personnel assigned to a functional CCMD position or billet required to conduct CDE are qualified and certified as CDE analysts, and understand theater-specific ROE and targeting tactics, techniques, and procedures.

6. (U) Services. Due to the nature of operations and the potential strategic risk posed to the U.S. Government, due diligence is critical to ensure personnel are trained, certified, and proficient in the CDM. At the appropriate echelon of command, Services will ensure Service organizations/formations that deploy in support of CCDRs have an organic CDE capability, as defined in Appendix I to Enclosure E. The following are Service roles and responsibilities:

a. (U) Ensure personnel assigned to a Service component position or billet required to conduct CDE are qualified and certified as CDE analysts.

b. (U) Send a letter of intent to Joint Staff Targeting in accordance with JCPS if desiring to establish a CDE program. Requesting organizations are responsible for funding their programs to include the training of their instructors and the accreditation of the program.

c. (U) Ensure CDE programs comply with guidance issued in this document.

d. (U) Identify a CDE program manager in writing to Joint Staff Targeting.

e. (U) Maintain a proficiency program based on standards established by their Service CDE program manager. The applicable CDE program manager will update analyst's initial qualification and track personnel certified as CDE analysts or instructors via the Joint Staff Targeting SIPRNET SharePoint site CDE Registry. Additionally, each Service should consider establishing appropriate specialty skill/experience identifiers to facilitate the tracking of qualified CDE analysts.

7. (U) DoD Combat Support Agencies (CSAs)/Service Intelligence Production or Targeting Centers. CSAs and Service Intelligence Production or Targeting Centers are responsible to identify and report NSEs to the appropriate Responsible Analytic Center (RAC) or CCMD. CSAs and Service Intelligence Production or Targeting Centers with a designated No-Strike Coordinator must have the access and skills necessary to support the No Strike Process. For example, efforts include NSE nominations function, location, and geospatial definition for entry into MIDB by the appropriate RAC. This includes geospatially enabled target materials that define the target/element outline of

11 December 2015

the NSE. (See Table 7 for hierarchy of geospatial coordinate sources). The MIDB is the authoritative national database to document requisite data on NSEs (see Enclosures B and C).

a. (U) Defense Intelligence Agency (DIA)

(1) (U) Defense Intelligence Agency's (DIA's) Operational Environment Analysis Division. This Division is responsible for developing and maintaining a database of diplomatic, religious, cultural, historical, educational, water, humanitarian, and urban NSEs. It maintains the expertise and capability to identify and locate these NSEs in order to preserve them and avoid collateral damage to the extent consistent with the mission and Law of War (LOW). The Operational Environment Analysis Division data requirements are documented with the IC for production and maintenance to support CDE.

(2) (~~U//FOUO~~) Defense Intelligence Agency's (DIA's) National Center for Medical Intelligence (NCMI). NCMI is responsible for developing and maintaining data and technical tools to assess significant human health risks associated with collateral damage. NCMI will assess human health risk from chemical contamination of air, food, water, or soil and from exposures that may result from accidental or intentional releases of toxic industrial chemicals, radiological/nuclear materials, and chemical warfare agents and related materials. Population data requirements for NCMI hazards analyses supporting CDE are filled by National Geospatial-Intelligence Agency (NGA). In addition, NCMI is responsible for developing and maintaining the health and medical related category codes database in the MIDB, with the expertise and capability to identify and assess medical facilities in order to preserve them and avoid collateral damage to medical infrastructure to the extent consistent with the mission and LOW.

b. (~~U//FOUO~~) Defense Threat Reduction Agency (DTRA). DTRA is responsible for developing and maintaining data and technical tools to conduct chemical, biological, or radiological (CBR) plume hazard estimation in support of CDE. DTRA maintains the expertise and capability to conduct timely plume hazard analysis in support of a Commander's CDE requirements. DTRA's population data requirements are documented with the IC for production and maintenance to support CDE.

c. (~~U//FOUO~~) Naval Oceanographic Office (NAVO). NAVO maintains the expertise and capability to provide analysis on above grade waterways and conduct a Riverine Environmental Intelligence Summary (RIVENTSUM) on a given river system. NAVO support is required to provide casualty estimates necessary if above grade waterways and dams are damaged and/or destroyed. These casualty estimates will be used during CDE Level 5 analysis for human

health and/or environmental hazards.

d. ~~(U//FOUO)~~ National Geospatial-Intelligence Agency (NGA). NGA provides targeting-related Geospatial Intelligence (GEOINT) to include imagery-derived intelligence and its associated geospatial attributes in support of all phases of the joint targeting cycle. These attributes include points, lines, polygons, and various geometries used to describe, assess, and visually depict physical features and geographically referenced activities. In addition, NGA partners with ORNL, the U.S. Government's premier institution for the study of human geography. ORNL produces population-density tables that support the CCMDs requirement for demographic data for countries and/or regions in their AOR to support operational planning and execution.

8. (U) Other organizations. Although not bound by this instruction, non-DoD U.S. Government agencies (e.g., Department of State) and Coalition partners should report operating locations within an AOR to the appropriate military command element or joint task force (JTF) to facilitate command and interagency coordination, and deconfliction of NSEs that occur via the joint interagency coordination group (JIACG) (see Enclosure F, reference b).

9. (U) Inherent Responsibility. It is the inherent responsibility of all commanders, observers, air battle managers, weapons directors, attack controllers, weapons systems operators, intelligence analysts, and targeting personnel to:

a. (U) Accurately locate targets and accomplish PID consistent with commander's guidance, current military objectives and mission specific ROE.<sup>3</sup>

b. (U) Identify potential collateral (i.e., No-strike) concerns in the vicinity of the valid military target prior to fires execution or target engagement (provide function, geospatial, and/or virtual demarcation if able).

c. (U) Apply the CDM with due diligence within the framework of the operational imperatives of accomplishing mission objectives, force protection, and collateral damage mitigation.

---

<sup>3</sup> PID is an identification informed by combat identification (CID), which is defined as the process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision, and friendly force tracking (FFT), which is the process of fixing, observing and reporting the location and movement of friendly forces. (Source JP 3-09).

11 December 2015

d. (U) Employ all feasible precautions to ensure only legitimate military objects are targeted and engaged and to take appropriate steps to avoid or minimize collateral damage and effects.<sup>4</sup>

---

<sup>4</sup> Feasible precautions are those precautions which are practicable or practically possible based on an assessment of information reasonably available at the time to those planning, authorizing, or executing targeting functions, and taking into account all circumstances ruling at the time, including humanitarian and military considerations.

ENCLOSURE B

(U) GENERAL GUIDANCE FOR NO-STRIKE ENTITIES (NSEs) AND  
COLLATERAL CONCERNS

1. (U) Introduction

a. (U) LOW requires all feasible precautions to ensure only legitimate military objects are targeted. It stipulates that anticipated civilian or noncombatant injury or loss of life and damage to civilian or noncombatant property incidental to attacks must not be excessive in relation to military advantage anticipated to be gained (see reference c for more detailed information).

b. (U) Failure to observe these obligations would be considered a LOW violation. Furthermore, the United States (U.S.) could be subject to global criticism, which could adversely impact military objectives, alliances, partnerships, or national goals. The U.S. Government places a high value on preserving civilian and noncombatant lives and property. The U.S. military must uphold these values through the conscientious use of force in the accomplishment of assigned military missions.

2. (U) General Guidance

a. (U) The basis for defining a facility, individual, virtual, equipment, or organization entity as a NSE is derived primarily from the body of international law collectively known as LOW. LOW incorporates international treaties and agreements adhered to by the U.S. Government, as well as customary international law, into a comprehensive set of guidance and requirements governing the conduct of modern warfare.

b. (U) Collateral Objects. Collateral objects are functionally defined NSEs that have a geospatial or virtual relationship to a target, and may be affected or potentially affected by target engagement. Knowledge of the location and function of collateral objects is essential to target development, the No-Strike process, and the CDM.

(1) (U) Treat collateral objects in accordance with policy and guidance prescribed in this instruction and operational ROE.

# ~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B

11 December 2015

(2) (U) Collateral objects located within the final collateral hazard area (CHA) after all mitigation techniques have been exhausted are defined as collateral concerns.

(3) ~~(U//FOUO)~~ Prior to striking a target, commands should ensure imagery used to support CDE analysis is not older than 90 days. This may be waived to 180 days by the Joint Force Commander (JFC) or formally designated representative if intelligence shows no indication of changes in collateral objects in the area of interest.<sup>5</sup>

(4) (U) IAW JP 3-60, joint targeting recognizes five types of entities: facilities, individuals, virtual entities, equipment, and organizations.

(5) (U) Collateral Damage. Collateral damage is defined as the unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. Collateral Damage analysis is the examination or evaluation of relations between targets, target engagement options and NSEs to estimate and assess collateral damage. To provide a common language framework, this publication further refines the following terms:

(a) (U) Collateral Damage Estimation (CDE): The holistic process of determining the potential for collateral damage resulting from target engagement.

(b) (U) Collateral Damage Estimation Methodology (CDM): A body of joint standards, methods, techniques and processes to conduct collateral damage analysis and produce collateral damage estimates.

(c) (U) Collateral Damage Estimate: An approximate calculation of potential collateral damage derived through analysis prior to target engagement.

(d) (U) Collateral Damage Assessment (CDA): An analytical judgment derived by determining the amount and effects of collateral damage post target engagement.

### 3. (U) No-Strike Entities (NSEs)

a. (U) NSEs are functionally characterized as civilian and/or noncombatant and therefore are protected from attack. NSEs are designated by the

---

<sup>5</sup> The 90/180-day imagery requirement does not imply intel-databasing or CDE graphic "refresh" standards.

11 December 2015

appropriate authority upon which attacks are prohibited in order to avoid violating international law or agreements, or damaging relations with coalition partners and indigenous populations.

b. (U) NSEs may include, but are not limited to medical, educational, diplomatic, cultural, religious, and historical sites, or other objects that do not, by their nature, location, purpose, or use, effectively contribute to the enemy's war-fighting or war-sustaining capability. These entities generally are not lawful targets under normal circumstances; NSEs are protected from the effects of military operations (i.e., they have a "protected status"). However, if used to advance military or enemy objectives, NSEs lose their protected status and may be subject to attack. For example, if a school is used to store weapons or is used for some other military purpose, its protected status is forfeited under the LOW and becomes a lawful military target.<sup>6</sup> When such a change in status occurs, the CCDR or authorized designee may approve the entity for attack (see Enclosure C, paragraph 7, for change of status guidance).

c. (U) NSEs Located on Military Installations. When located on installations determined to be lawful military targets, NSEs should be evaluated as collateral objects and mitigated in accordance with Enclosure E. It must be assumed these entities host protected functions unless confirmed otherwise.<sup>7</sup> Physical NSEs must be geospatially defined, developed as separate facilities associated to the installation, and assigned a functional category code and O-suffix, as appropriate. Proximity of lawful military targets to NSEs does not preclude engagement of the lawful military target. However, in these circumstances the commander must weigh the anticipated loss of life, damage to property, or other negative effects incidental to the attack versus the military advantage expected to be gained by the attack. The anticipated injury or loss of civilian or noncombatant life, damage to civilian or noncombatant property, or any combination thereof, incidental to attacks must not be excessive in relation to the military advantage expected to be gained.

d. (U) NSEs Versus Restricted Targets. Restricted targets are different from NSEs. Restricted targets are those valid military targets that support the attainment of operational objectives, but have been restricted from specified means of engagement for operational, political, intelligence gain/loss,

---

<sup>6</sup> Under the Geneva Convention 1, Article 21, in the specific case of hospitals, "Protection may, however, cease only after a due warning has been given, naming in all appropriate cases, a reasonable time limit, and after such warning has remained unheeded."

<sup>7</sup> If the function of these entities is confirmed as supporting a military objective, it is not necessary to treat them as collateral objects. These entities are deemed lawful targets IAW reference d, and any incidental damage sustained as a result of combat operations should be considered additional damage as defined in reference e.

11 December 2015

environmental, collateral damage, and/or ROE considerations).<sup>8</sup> CCDRs are required to identify, develop, maintain, and distribute a list of restricted targets (known as the Restricted Target List, or RTL) for tasked plans and/or OPORDs within their assigned AOR. The RTL provides the target identification, effects restrictions, nominating command/agency, rationale, and approval authority for target engagement and effects. The RTL must be separate and distinct from the NSL.

4. (U) Dual-Use Entities. Dual-use entities are defined as those valid military targets characterized as serving both a military and civilian or noncombatant purpose or function. In many cases, dual-use entities are associated with senior governmental level command and control; national communications infrastructure; media centers; national power and petroleum, oil, and lubricants infrastructure; industrial facilities; and public utilities providing support to both the enemy combatant and civilian population.

a. (U) Commanders are responsible for determining: (1) the predominant function of a NSE, based on current intelligence, (2) deciding that the target has lost its LOW protected status and becomes a valid military target or dual-use entity, or (3) that the target has not lost its LOW protected status and remains a NSE. The ROE for a specific operation provides the authorizations and/or prohibitions for targeting dual-use entities. Regardless of the ROE in effect, civilian personnel present within the geospatially defined outline of dual-use facilities are classified as noncombatant or civilian casualties for the purpose of casualty estimation (CE) under guidance provided in Enclosure E.

b. (U) NSEs occupied by enemy combatants for the purpose of advancing military objectives, and which no longer also serve a legitimate civilian function or purpose, can lose their LOW protection. Similarly, if the function of an NSE is determined to be supporting military operations and/or objectives exclusively, it is not classified as dual-use. Such may be deemed lawful targets in accordance with Enclosure F, reference d (also see this Enclosure, subparagraph 5.b.). It is the responsibility of the CCMD to ensure dual-use status is reconciled in MIDB.

5. ~~(U//FOUO)~~ Human Shields. Human shields are civilian or noncombatants placed around a valid military target by a combatant to hinder attack of that target. The U.S. LOW delineates between voluntary and involuntary human shields (see Enclosure F, reference c). Voluntary human shields are civilians or noncombatants who voluntarily and intentionally place themselves in the line

---

<sup>8</sup> Valid targets are candidate targets that have gone through validation. Validation is "A part of target development that ensures all candidate targets meet the objectives and criteria outlined in the commander's guidance and ensures compliance with the law of armed conflict and rules of engagement." JP 3-60, Joint Targeting, reference f.

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**

CJCSI 3160.01B

11 December 2015

of fire so as to disrupt that line of fire. Voluntary human shields are considered willing participants in hostilities; they have shed their protected status and are direct participants in hostilities. In other instances, the enemy may either forcibly place (involuntary) or deceptively encourage (unwitting) civilians or noncombatants to be present at valid military targets, and these personnel are considered protected persons. Conducting pattern of life analysis will aid in determining voluntary and involuntary status of human shields. During CDE analysis, only unmitigated involuntary, unwitting, or status unknown human shields must be accounted for in CDE Level 5 analysis.

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**

~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

B-6

Enclosure B

~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX TO ENCLOSURE B

### (U) INFORMATION RELATED CAPABILITY COLLATERAL DAMAGE ESTIMATION (CDE) POLICY AND GUIDANCE

#### 1. (U) Introduction

a. (U) Significant advancements in communications, computing and networking technologies provide increasing opportunities to use information-related capabilities (IRCs), including nonkinetic fires, for force application or as enablers to kinetic weapons.<sup>9</sup> The employment of IRCs also requires reasonable measures be taken to avoid generating unintentional or incidental effects to collateral entities.

b. (U) IRCs create effects in the physical, information, and cognitive dimensions or in the physical and cyberspace domains. While IRCs may be nonkinetic, it does not imply they are nonlethal. The terms kinetic and nonkinetic relate to the physics of forces and material bodies or lack thereof. Lethality is a measure of effect, specifically a fatal effect. IRCs including nonkinetic capabilities may cause lethal effects.

#### 2. (U) Information-Related Capabilities (IRC) Collateral Damage Estimation (CDE) and Collateral Effects Estimation (CEE)

a. (U) The nature of virtual and organization entities and employment of IRCs present unique challenges to collateral damage analysis. Methodologies to estimate those effects continue to mature. Dual-use, shared, or overlapping combatant and noncombatant networks create a risk of cascading collateral effects. Consequently, extensive intelligence and understanding of the target's physical and information environment is necessary to identify potential second and higher order effects.

b. (U) Damage is the effect of loss or harm resulting from injury to person or property. Though IRCs may generate temporary or permanent effects chiefly or wholly within cyberspace, the results of those effects shall be considered damage in this publication.

---

<sup>9</sup> According to Joint Publication 3-13, Information Operations, information-related capabilities (IRCs) includes tools, techniques or activities employed within a dimension of the information environment, which can be used to achieve a specific end(s).

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

c. (U) CEE is the holistic process of predictively evaluating potential collateral effects beyond physical damage, including cognitive effects resulting from the employment of weapons or IRCs.

d. (U) Currently there is not a joint CDE or CEE methodology for IRCs. CCMDs should coordinate with USCYBERCOM to develop a repeatable methodology for identification and management of risks associated with cyberspace operations. Similar coordination should occur to develop CDE and CEE methodologies for other IRCs. CCMD and Service developed methodologies should address the same five basic questions of the joint CDM, but with modified considerations.

(1) (U) Has PID of the target been established?

(a) (U) Distinction remains a key LOW consideration. Operational planners should employ combat identification (CID) processes to support accomplishment of PID and demarcate the intended target from collateral objects. Demarcation of collateral objects in the physical, informational and/or cognitive dimensions is necessary to determine risk to mission, risk to force and risk to collateral objects.

(b) (U) Virtual entities may have a variety of attributes that allow PID, such as the internet protocol or uniform resource locator (URL) addresses related to websites. It is important to highlight that virtual entities may have discoverable, physical attributes depending on the fidelity of the intelligence available. If feasible, the geospatial location of any physical systems or nodes that utilize the virtual network should be determined.

(2) (U) Are there protected or collateral objects, including civilian or noncombatant personnel, human shields (involuntary, unwitting, or status unknown), virtual shields, CBR plume hazards, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target?

(a) (U) Calculating the effects range for IRCs can be complex. A thousand miles of physical distance may be less relevant than the number of links or nodes to the next nearest entity or similarities of coding in the cyberspace domain.

(b) (U) Analysis of the weapon effects range and collateral objects exposed will help facilitate accurate CDE.

(3) (U) Can I mitigate damage to those collateral entities by striking the target with a different weapon or with a different method of engagement, yet

Appendix  
Enclosure B

B-A-2

# UNCLASSIFIED

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

still accomplish the mission? Just as fuzing or aimpoints can be adjusted for kinetic weapons, characteristics of IRCs can be manipulated to mitigate collateral damage and effects concerns. This may include adjustments to power, code and timing to prevent weapon effects reaching a collateral entity.

(4) (U) How many civilian and noncombatant casualties do we think the attack will cause?

(5) (U) Are the collateral effects of my attack excessive in relation to the expected military advantage gained, and do I need to elevate this decision to the next level of command to attack the target based on the ROE in effect?

e. (U) Virtual and organization targets may span multiple AORs and therefore require special coordination between CCMDs, the IC and civilian authorities.

3. (U) Effects Mitigation. The employment of IRCs must be conducted with the same degree of consideration for mitigating human suffering and property damage as that of conventional fires.

a. (U) It is the inherent responsibility of IRC planners and operators to consider collateral effects prior to engagement. Use of IRCs and/or nonkinetic fires does not limit a commander's inherent right of self-defense under the LOW, provided the requisite authority to engage exists.

b. (U) The need to conduct CDE and/or CEE for IRCs is separate and distinct from proportionality analysis.

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

B-A-4

**UNCLASSIFIED**

Appendix  
Enclosure B

ENCLOSURE C

(U) THE NO-STRIKE PROCESS

1. (U) Introduction. Participation and cooperation among stakeholders is critical to the success of the No-Strike process. Non-DoD stakeholders, in particular, play a key role in protecting life and property by identifying the location and functionality of nonmilitary entities. Specific instructions on database and NSL development are provided in the appendix to this enclosure.

2. (U) No-Strike Entity (NSE) Identification, Characterization, and Nomination

a. (U) Identification, characterization, and nomination of NSEs are the first steps in the No-Strike process. All stakeholders have the responsibility to identify and characterize the functionality of NSEs as accurately as possible and report this information to the responsible CCMD, JTF, or U.S. Government Department or Agency in a timely manner.

b. (U) To increase the accuracy and currency of reporting on entities, CCMDs should encourage responsible producers, service production centers and/or the IC to provide a geospatially accurate polygon (e.g., shape or vector file) to define the target/element outline of the NSE facility along with an expected duration of occupancy. This information is essential to the collateral damage process and allows more efficiency via automated tools.

c. (U) NSE facilities are categorized based on their sensitivity: Category I (CAT I) (most sensitive) and Category II (CAT II) (less sensitive). Because no sensitivity criteria have been established for entities other than facilities, in this publication the terms CAT I and CAT II will only be applied to facilities.

d. (U) CCMD and or JTF designated analyst must verify NSE nominations using the NSE verification process.

e. (U) NSEs require the same accuracy in location and geospatial definition as that of lawful military targets. Accurate positioning and locational (geospatial and virtual) development of NSEs and identification of collateral damage/effects concerns is part of deliberate and dynamic targeting and is a continuous process that does not end when military operations commence (see Enclosure F, reference f for detailed discussion on the deliberate and dynamic targeting processes). The continuous identification and development of NSEs, well in advance of and throughout military operations, is critical to campaign success.

3. (U) No-Strike List (NSL) Generation and Maintenance

a. (U) NSL generation and maintenance must be an assigned task with frequent and routine reviews by the CCMD No-Strike Coordinator. NSLs identify and functionally characterize LOW-protected NSEs forming the strategic and operational basis for target deconfliction during operational planning. NSLs support CDE within the target development process and support deconfliction of Joint Fires during execution. Participation by stakeholders and verification by the appropriate agencies will yield NSL additions, changes, and/or deletions on a regular basis. Active maintenance will ensure the most up-to-date information is available to planners and battle management systems supporting target planning and CDE.

b. (U) No-Strike Categories. Querying a core set of MIDB category codes (CATCODEs) can begin generation of a rudimentary NSL (see Table 5). The results from this query should become the foundation of the NSL (for any AOR country or operation). This set may be modified and/or expanded by the CCMDs in coordination with the Joint Staff based on approved operational ROE and as the military and political situation dictates.

(1) (U) NSE facilities are represented by MIDB functional CATCODEs for the purposes of intelligence production, target development, and standardized description of each functional category. Tables 1 through 4, below, show the facilities by category type and tie specific CATCODEs to their description (number in parenthesis).

(2) (U) CAT I NSEs. This category includes the most sensitive subset of NSE facilities addressed by the LOW, other international and domestic laws, and significant policy concerns. These objects typically constitute the core of the NSL (see Enclosure C, Appendix A). These NSEs may or may not be on the NSL depending on factors such as dual-use, and whether the military advantage to be gained outweighs relevant LOW and policy concerns.

CATCODE Grouping	CAT I NSE Facility Description
1	Diplomatic offices, foreign missions, and sovereign nonmilitary property of other nations within the AORs
2	Religious, cultural, historical institutions, cemeteries, and structures
3	Intergovernmental organizations (e.g., United Nations, North Atlantic Treaty Organization) and Nongovernmental organizations (e.g., International Committee of the Red Cross, Amnesty International) property, equipment, and personnel
4	Medical facilities (both civilian and military)
5	Public education facilities including nonmilitary schools, colleges, universities, child/day care centers, and institutes
6	Civilian refugee camps and concentrations
7	Prisoner of war camps and concentrations and government detention facilities/prisons
8	Facilities (e.g., utilities, industrial plants, storage depots, etc.) whose engagement may result in pollution or have the potential to release toxic chemicals that cannot be contained, and may contaminate air, food, soil or water resources
9	Dams or dikes whose engagement may result in the flooding of civilian areas
10	Facilities whose engagement may threaten the life, health, safety or support of astronauts and/or manned space flight missions

~~(U//FOUO)~~ Table 1. Category I NSE Descriptions

# ~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B  
11 December 2015

<b>MIDB CATCODE</b>	<b>FUNCTION</b>
42140	Thermal Power Plants, Nuclear (8)
43110	Water Supply Facilities, Treatment Plants (8)
43111	Water Supply Facilities, Treatment Plants, Potable, Desalinization (8)
43112	Water Supply Facilities, Treatment Plants, Potable, Compact Unit (8)
43121	Water Supply Facilities, Storage Facilities, Reservoirs (9)
43210	Waste Facilities, Sewage Processing (8)
43400	Medical Facilities (4)
43410	Hospitals (4)
43420	Medical Clinics (4)
43430	Medical Dispensaries (4)
43440	Medical Laboratories (4)
43450	Blood Banks (4)
43460	Convalescent or Medical Rehabilitation Centers (4)
43470	Veterinary Hospitals or Clinics (4)
43480	Veterinary Laboratories (4)
43800	Dikes and Other Water Control Features, General (9)
43810	Dikes and Other Water Control Features, Critical Dike Sections (9)
43820	Dikes and Other Water Control Features, Water Control Features, Other Than Dikes and Dams (9)
43900	Dams, General (9)
43910	Dams, Concrete Dams (9)
43920	Dams, Earthen or Rock-Filled Dams (9)
43930	Dams, Masonry Dams (9)
43940	Dams, Composite Dams, General Dam Entry (9)
43941	Dams, Composite Dams, Concrete Component of Composite Dam (9)
43942	Dams, Composite Dams, Earthen or Rock-Filled Components of Composite Dams (9)
43943	Dams, Composite Dams, Masonry Component of Composite Dam (9)
49600	Nonmilitary Schools, General (5)
49610	Nonmilitary Schools, Grammar Schools, Secondary Schools and High Schools (5)
49620	Nonmilitary Schools, Colleges and Universities (5)
49630	Nonmilitary Schools, Technical and Trade Schools (5)
49640	Nursery School, Preschool Care Day Care (5)
49650	Nonmilitary Schools, Madrassas (5)
49660	Orphanages, Institution for the Care of Orphans and Abandoned (5)
72000	Medical Training Facilities, Type Not Specified (5)
72100	Schools, Medical Unidentified (5)
72110	Schools of Medicine (5)
72120	Schools of Dentistry (5)
72130	Veterinary Schools (5)
72140	Schools of Nursing (5)

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**

CJCSI 3160.01B  
11 December 2015

<b>MIDB CATCODE</b>	<b>FUNCTION</b>
72150	Schools of Pharmacy (5)
72160	Paramedical Training Schools (5)
72170	Veterinary Technician Training Schools (5)
72300	Medical Interest Site (4)
75300	Civilian Refugee Camps (6)
75900	Prisoner of War (POW) Concentrations (7)
77500	Government Detention Facilities, General (7)
77510	Government Detention Facilities, Prisons, Nonmilitary (7)
77520	Government Detention Facilities, Prisons, Military (7)
77600	Religious, Cultural and Historical Institutions, General (2)
77610	Religious Institutions (2)
77611	Religious Institutions, Church (2)
77612	Religious Institutions, Mosque (2)
77613	Religious Institutions, Temple (2)
77614	Religious Institutions, Synagogue (2)
77615	Religious Institutions, Shrine (2)
77620	Cultural and Historical Institutions (2)
77621	Museums (2)
77622	Archives (2)
77623	Libraries (2)
77624	Cultural and Ideological Centers (2)
77625	Monuments and Statues (2)
77626	Monuments and Statues (on Military Bases) (2)
77627	Ruins, Antiquities, Archaeological Sites, Citadels, Castles (2)
77630	Cemeteries (2)
77631	Tombs (2)
77632	Grave Sites, Family Sized Plots (2)
77700	Libraries (2)
77800	Diplomatic Offices and Foreign Missions, General (1)
77810	Diplomatic Offices and Foreign Missions, Embassies (1)
77820	Diplomatic Offices and Foreign Missions, Legations (1)
77830	Diplomatic Offices and Foreign Missions, Consulates (1)
77831	Diplomatic Offices and Foreign Missions, Honorary Consulates (1)
77840	Diplomatic Residences, Ambassador, DCM, and Marine Residence (1)
77841	Diplomatic Residences, Diplomatic Staff (1)
77850	Foreign Missions and Government Offices (1)
77860	Designated Assembly Areas (1)
77870	Non-Governmental Organizations (3)
84001	Space Crew Training (10)
84002	Facilities that support human space flight (10)

~~(U//FOUO)~~ Table 2. Category I Collateral Objects

(3) (U) CAT II NSEs. This category includes the remainder of NSE facilities addressed by the LOW, other international and domestic laws, and significant policy concerns. These NSEs may have their protective status removed depending on dual-use status and/or whether the military advantage to be gained outweighs relevant LOW and policy concerns.

CATCODE Grouping	CAT II NSE Facility Description
11	Nonmilitary billeting and accommodations including private civilian housing and family housing on military or government property
12	Civilian meeting places including athletic fields, stadiums, racetracks, parks, civic and convention centers, theaters, amusement parks, markets, and recreational facilities
13	Public utilities and facilities including those that generate, distribute, or transport electricity, petroleum or water intended for civilian consumption; commercial fuel service stations, civilian mass transit facilities, water supply facilities, waste facilities, urban gas supply, fire stations, postal facilities, police stations, civil defense facilities, and financial institutions
14	Agricultural processing and storage facilities that produce, market or distribute foodstuffs for civilian consumption

~~(U//FOUO)~~ Table 3. Category II NSE Descriptions

~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B  
11 December 2015

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
18200	Agricultural Raw Materials, Vegetables, General (14)
18210	Agricultural Raw Materials, Grain Storage, General (14)
18211	Agricultural Raw Materials, Grain Storage, Underground or Earth-Covered Bunkers (14)
18212	Agricultural Raw Materials, Grain Storage, Elevators (14)
18213	Agricultural Raw Materials, Grain Storage, Horizontal Bulk (14)
18214	Agricultural Raw Materials, Grain Storage, On-Farm (14)
18300	Animal Raw Materials [Includes Fish] (14)
42000	Electrical Power Generating, Transmission, and Control (13)
42100	Thermal Power Plants, General (13)
42110	Thermal Power Plants, Steam Turbine (13)
42120	Thermal Power Plants, Gas Turbine (13)
42130	Thermal Power Plants, Diesel (13)
42150	Thermal Power Plants, Geothermal (13)
42190	Thermal Power Plants, Combination (13)
42200	Hydroelectric Power Plants, General (13)
42210	Hydroelectric Power Plants, Storage, General (13)
42211	Hydroelectric Power Plants, Storage, Base-of-Dam (13)
42212	Hydroelectric Power Plants, Storage, Diversion (13)
42220	Hydroelectric Power Plants, Run-of-River, General (13)
42222	Hydroelectric Power Plants, Run-of-River, Diversion (13)
42230	Hydroelectric Power Plants, Pumped Storage (13)
42240	Hydroelectric Power Plants, Tidal (13)
42290	Hydroelectric Power Plants, Combination (13)
42300	Alternate Energy Power Plants (13)
42600	Electrical Power Substations, General (13)
42610	Electrical Power Substations, Transformer (13)
42620	Electrical Power Substations, Switching (13)
42630	Electrical Power Substations, Traction (13)
42640	Electrical Power Substations, Converter (13)
42650	Electrical Power Capacitor Substations (13)
42660	Electrical Power Taps (13)
42700	Electrical Power Control Centers, General (13)
42710	Electrical Power Control Centers, National (13)
42720	Electrical Power Control Centers, Regional (13)
42730	Electrical Power Control Centers, Local (13)
43000	Public Utilities (13)
43010	Urban Utility, Steam Heating Plant (13)
43100	Water Supply Facilities, General (13)
43120	Water Supply Facilities, Storage Facilities, General (13)

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**CJCSI 3160.01B  
11 December 2015

<b><u>MIDB CATCODE</u></b>	<b><u>FUNCTION</u></b>
43122	Water Supply Facilities, Storage Facilities, Tanks (13)
43123	Water Supply Facilities, Storage Facilities, Towers and Standpipes (13)
43130	Water Supply Facilities, Pumping Stations (13)
43140	Water Supply Facilities, Sources, General (13)
43141	Water Supply Facilities, Sources, Wells (13)
43142	Water Supply Facilities, Sources, Springs (13)
43143	Water Supply Facilities, Sources, Rivers or Streams, Intake Points (13)
43144	Water Supply Facilities, Sources, Lakes, Intake Points (13)
43145	Water Supply Facilities, Sources, Salt Water Bodies, Intake Points (13)
43150	Water Supply Facilities, Irrigation Pump Stations (13)
43160	Water Supply Facilities, Water Pipeline Segments and Aqueducts (13)
43190	Water Supply Facilities, Water Drilling Towers (13)
43200	Waste Facilities, General (13)
43220	Waste Facilities, Solid Waste Processing, General (13)
43221	Waste Facilities, Solid Waste Processing, Transfer Stations (13)
43222	Waste Facilities, Solid Waste Processing, Landfills (13)
43300	Mass Transit Facilities, General (13)
43310	Mass Transit Facilities, Barns And Parks (13)
43320	Mass Transit Facilities, Repair Plants (13)
43330	Mass Transit Facilities, Combined Parking and Repair Facilities (13)
43340	Mass Transit Facilities, Subway Facilities or Heavy Rail (13)
43500	Urban Gas Supply, General (13)
43510	Urban Gas Supply, Gas Manufacturing (13)
43520	Urban Gas Supply, Gas Storage, General (13)
43521	Urban Gas Supply, Gas Storage, Gasholders (13)
43522	Urban Gas Supply, Gas Storage, Storage Tanks (13)
43523	Urban Gas Supply, Gas Storage, Reservoirs, Underground (13)
43530	Urban Gas Supply, Gas Storage, Bottling Plants (13)
43600	Fire Stations (13)
43700	Postal Facilities (13)
44400	Ferry Facilities, Highway, General (13)
46000	Urban Services, General (13)
46100	Nonmilitary Motor Services (13)
46110	Commercial Fuel Service Stations (13)
46120	Nonmilitary Motor Pools (13)

# ~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B  
11 December 2015

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
46200	Recreational Facilities, Athletic Fields, Parks, Civic Centers, Theaters, General (12)
46210	Recreational Facilities (12)
46220	Athletic Fields (12)
46230	Stadiums (12)
46240	Race Tracks (12)
46250	Parks (12)
46260	Civic and Convention Centers (12)
46270	Theaters (12)
49700	Nonmilitary Billeting and Accommodations (11)
49710	Hotels, Motels, Inns to Include Hotels Motels, Inns, Bed and Breakfasts, and Hostels (11)
49720	Apartment Complexes (11)
49730	Residences, Non-Diplomatic (11)
58900	Food, Feed, Beverage, and Tobacco Storage (14)
77000	Merchandising, Retail and Government, General (13)
77100	Merchandising, Marketing, and Stores(13)
77110	Department Stores, Malls, Shopping Centers, and Shopping Plazas (13)
77120	Market, General (13)
77140	Restaurants (13)
77200	Financial Institutions, General (13)
77210	Central Government Banking, Financial, Economic, Commercial, Treasury or Trade Organizations (13)
77220	Domestic Banking, Insurance, Finance, Exchanges, Brokerage Houses or Gambling Establishments (13)
77230	Foreign Banking, Insurance, Finance, Exchanges, Brokerage Houses or Gambling Establishments (13)
77240	Currency Dealers and Exchangers, Check Cashers, Money Transmitters or Hawala--Money Services Businesses (MSBS) (13)
77250	Global or Regional Lending Organizations Formed by Treaty or International Agreement -- Intl Financial Institutions (IFIS) (13)
77900	Trade, Commerce, and Financial, General (13)
77910	Stock Market (13)
77920	Chamber/Department of Commerce (13)
78100	Civil Defense Facilities, General (13)
78110	Civil Defense Facilities, Population Protection (13)
78120	Civil Defense Facilities, Civil Defense Training Facilities (13)
78130	Civil Defense Facilities, Civil Defense Forces Facility (13)

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
78140	Civil Defense Facilities, Civil Defense Reserve Storage Facilities (13)

~~(U//FOUO)~~ Table 4. Category II Collateral Objects

(4) (U) Modification. No-Strike categories may be modified by the Secretary of Defense (SecDef) or President of the United States (POTUS) as the military or political situation dictates. Changes to these categories will be reflected in operation-specific ROE and/or via strategic/operational command guidance. Entities may be removed from the NSL under CCMD authority based on an assessment of military use in whole or part (for dual-use entities), and change of CATCODE as appropriate for non-dual-use entities.

c. (U) Automation Guidelines. Guidelines for automated NSL generation contained in this instruction currently apply to NSEs produced and maintained in MIDB with geographic coordinates. Computer Networks for protected functions may also be considered as NSEs. If required, entry of virtual or organization NSEs (e.g., individuals, accounts, computer networks) on NSLs may be manually accomplished until production policy, capability, and standardized procedures to database these entities mature. Additionally, NSEs may have virtual or organization aspects (e.g., elements) that are protected; these can be databased in the remarks section of the associated NSEs. Joint Staff Targeting will update this instruction as policy, capability, and procedures develop for the handling and databasing of virtual or organization NSEs.

d. (U) Automated Tools. Although multiple tools can accomplish CATCODE queries of MIDB, the current system of record for joint targeters is the Joint Targeting Toolbox (JTT). The National Production Workshop (NPW) provides another option to search by CATCODE. Query procedures are described in each tool's respective help functions. NSLs should include the following information, at a minimum: country code, entity identification (e.g., BE number), O-suffix (where applicable), record status, CATCODE, entity name, associated geocoordinate (or virtual location), and coordinate derivation method (sorted in that order, from left to right). Lists should be saved with the naming scheme "COUNTRY, OPTIONAL NSL CATEGORY, NSL ACRONYM," (e.g., "AFGHANISTAN, CAT I NSL").

e. (U) Automated Display. Once generated and saved, the NSL can be displayed as an overlay in battle management systems such as the Global Command and Control System (GCCS) and Joint Automated Deep Operations Coordination System (JADOCs). Combining NSL entities in an overlay with geospatial intelligence, tasking and/or fires orders, and other operational data

11 December 2015

provides targeteers enhanced situational awareness in collateral damage avoidance, particularly for dynamic targeting.

4. (U) No-Strike List (NSE) and No-Strike List (NSL) Verification

a. (U) CCMDs verify entities on the NSL are not on the Joint Target List (JTL) or RTL and vice versa. Whenever there is a change in the NSL, RTL, or JTL, CCMDs must compare the other lists to look for discrepancies. For dynamic targeting, each lawful target must be run against the NSL to ensure the target is not a protected entity, and to perform CDE and mitigation as necessary. When applicable, a check of the JTL against the RTL will ensure that individual RTL target restrictions are not violated.

b. (U) DIA performs overall supervision of the responsible producer (RESPROD) for all NSE facility CATCODEs. All NSE nominations go to the RESPROD for approval. Approval includes verification that the CATCODE is accurately attributed. DIA will verify NSEs for database errors, problems, and inconsistencies. These will include:

(1) (U) Inaccurate city center coordinates.

(2) (U) Multiple identification numbers and/or names for the same entity.

(3) (U) Mismatched identification numbers and entity names.

(4) (U) Improperly assigned CATCODE and/or O-suffix.

c. (U) DIA RESPRODS have the authority to formally grant write permission to commands for select NSE production.

d. (U) The CCMD should verify the NSEs do not contain database errors, problems, or inconsistencies.

e. (U) Unverified Entities. At the discretion of the CCMD, unverified entities may be added to the NSL to ensure their protection. Efforts must be made to positively identify and locate the entity as soon as possible. However, if the nominated entity is at risk, its early addition to the NSL is a prudent action.

f. (U) In circumstances where NSEs are found within the physical boundaries of a lawful military target, the lawful target is placed on the JTL and the NSE is placed on the NSL. The two might share the same identification (e.g., BE, unit identification) number but would be differentiated by CATCODE,

11 December 2015

O-suffix, and, in many cases, entity name. Proximity does not preclude engagement of the lawful target as long as any conflict between the NSE and lawful target is resolved IAW Enclosure B and requisite approvals sought, if necessary, in accordance with Enclosure F, reference a.

5. (U) No-Strike List (NSL) Coordination and Approval

a. (U) Coordination of the NSL should be accomplished with appropriate functional elements of the CCDR/Joint Force Commander (JFC) staff, such as the Staff Judge Advocate, the JIACG, coalition liaisons, civil affairs, or other appropriate elements specific to the operation. **Thorough coordination between each responsible agency is necessary, and failure to do so could result in injury to noncombatants, civilians, or friendly forces; the unintended destruction of property; or mission failure.**

b. (U) The CCMD is responsible for NSL development.

c. (U) Approval. NSL approval is a CCDR responsibility, and the procedures governing NSL approval are a command function. Internal authority for NSL approval within CCMDs will vary between commands and operations.

d. (U) CCMDs establish procedures for updating the NSL. Updates to procedures and timelines may vary between the planning and execution phases of an operation. Internal and external reviews may be limited to just the additions or deletions from the list, since entities on the original NSL were already verified. CCMDs establish procedures for updating the NSL.

6. (U) No-Strike List (NSL) Dissemination

a. (U) After approval, the geographic CCDR shall ensure routine and timely dissemination of NSLs to all subordinate and supporting commands and supported functional commands with a periodicity appropriate for the tempo of operations. Subordinate and supporting commanders must then ensure the NSL is disseminated down to every level of their commands and dynamically updated in the MIDB for all organizations to utilize.

b. (U) The primary means of disseminating NSLs is over the MIDB.

c. (U) Secondary mechanisms may be necessary for coalition and/or other units and organizations not connected to the MIDB architecture. Secondary dissemination shall occur via Web posting, e-mail, record message traffic, or other means to ensure widest distribution to components, JTFs, and federated targeting and combat assessment partners. CCMDs are responsible for timely

11 December 2015

updates to the NSL as changes are identified. (U) Delaying the dissemination of changes to the NSL increases the risk of unnecessary and unintended collateral damage.

7. (U) No-Strike Entity (NSE) Change of Status. NSEs that lose their protected status should be removed from the NSL as prescribed in the following paragraphs.

a. (U) Upon losing protected status, the entity's MIDB record must be updated to reflect the new functional characterization. When this occurs, create a second MIDB record with the appropriate CATCODE and O-suffix for facilities, or assign a second function code for all other target types. Creating a second record with a new CATCODE would not remove the initial No-Strike CATCODE from the associated facility record in MIDB, but would reside **in conjunction with** the No-Strike CATCODE. As long as this alternate "hostile" CATCODE/function code assignment was in effect, the CCMD would have the option of striking the entity. For dual-use entities, a remark indicating the dual-use nature should be made in the MIDB record. As long as this remark is in effect, the CCMD has the option of striking the entity.

b. (U) Before strikes can be approved and executed, the CCMD must remove the NSE from the NSL and place the entity identification number with the appropriate secondary "hostile" CATCODE/function code on the JTL (or RTL, as appropriate). Unless designated by higher authority, the CCDR or his/her designated representative is the only level of command authorized to change the status of an entity on the NSL. Close and timely coordination between the CCMD, Joint Staff Targeting, and the appropriate RACs is imperative to minimize confusion. CCMDs must document changes to the NSL by date-time-group (DTG) and reason for the change. For dual-use entities, the entity's CATCODE found on the CAT I/CAT II lists will still be used.

c. (U) Exceptions to guidance in subparagraph 7.b are those instances where:

- (1) (U) Intelligence confirms the use of the NSE for a military purpose and the need to strike is time sensitive and/or,
- (2) (U) Troops are in contact and taking hostile fire from NSEs.

d. (U) These entities do not have to be reflected on the JTL before they can be engaged. (U) Unless this authority is expressly limited in SecDef-provided supplemental ROE, operational imperatives and established ROE, including the inherent right and obligation of self-defense, provide the requisite authority to engage in these instances.

e. (U) For those CCMDs that do not have RESPROD authority to assign insurgent CATCODEs and for all other categories of activities other than insurgency or terrorism, the CCMD must coordinate with the national RAC to affect a change in status per established nomination-database change request (NOM-DCR) procedures. To facilitate change of status and re-characterization of NSEs, the CCMD must develop procedures to coordinate with national RACs to codify and institutionalize the process. If the need to prosecute becomes time-sensitive, coordination timelines compress and procedures need to include the ability to coordinate and expedite re-characterization of potential target nominations. It is recommended the process include initial verbal coordination with the RAC, followed by written confirmation, and a formal NOM-DCR. The RAC must attempt to implement change requests within CCMD-specified timeframes.

f. (U) From the time an NSE loses its protected status and is characterized as a lawful military target, periodic reviews of available intelligence are recommended at both the theater and national levels to ensure the most current and accurate characterization and categorization. If this lawful military target shows no indication of reverting to its primary function after 12 months, commands should work with the RACs to remove the NSE from the database, leaving only the lawful military target. The removed NSE should be kept under review by the RAC IAW Defense Intelligence Analysis Program (DIAP) guidelines and established MIDB business rules.

8. (U) No-Strike List (NSL) and Target Engagement. Targets must be verified against the latest NSL prior to attack. CDE and mitigation will be accomplished IAW Enclosure E and the governing ROE for the particular operation. Certain sensitive targets may require SecDef and POTUS approval, regardless of collateral damage mitigation, and will be forwarded for review and approval in accordance with Enclosure F, reference a.

9. (U) Follow-on Operations. NSEs typically consist of facilities and locations important to planners in follow-on stability operations, such as hospitals, food distribution points, and refugee camps. These and similar locations could be inappropriately exploited by insurgent or terrorist groups, in which case they may lose their protected status. Consequently, the No-Strike process remains a U.S. government priority even after the cessation of major operations. By mitigating human suffering and property damage, the No-Strike process will accelerate recovery in post-conflict operations and minimize operational limitations routinely imposed as a result of international sensitivities over the humanitarian impacts of military operations.

APPENDIX TO ENCLOSURE C

DATABASE DEVELOPMENT

1. (U) No-Strike Entity Identification, Nomination, and Development

a. (U) Identification. Table 5 lists the MIDB CATCODEs that will be used as the core foundation for NSLs (for any country or operation). Categories 41500 (Computer Networks), 41510 (Computer Network Service Providers), and 41520 (Computer Networks, Information Production and Storage) are also potential No-Strike categories depending on the protected function they support (e.g., Hospitals, Water Control). This list represents the CATCODEs that must be used to develop an NSL due to LOW; however, it is not all inclusive. CCMDs may have other categories reflected on the NSL based on theater ROE. See Enclosure C for additional detail regarding these categories.

42140	Thermal Power Plants, Nuclear
431XX	Water Supply Facilities
43210	Waste Facilities, Sewage Processing
434XX	Medical Facilities
438XX	Dikes and Other Water Control Features
439XX	Dams
496XX	Civilian Schools
72XXX	Medical Training
75300	Civilian Refugee Camps
75900	Prisoner of War Camps
775XX	Government Detention Facilities
776XX	Religious, Cultural, Historical Institutions
77700	Libraries
778XX	Diplomatic Facilities, Foreign Missions, and Nongovernmental Organizations

~~(U//FOUO)~~ Table 5. Core No-Strike List Category Codes

b. (U) Production Prioritization. If there is an existing JTL and/or RTL, they shall be used to focus the IC and prioritize their MIDB production and review efforts for possible NSEs. If a JTL/RTL does not exist, established special engagement zones, named areas of interest (NAI), or designated search areas may serve the same purpose. If none of these exist, CCMD personnel

shall attempt to refine the scope of effort for the IC by geographic/regional priority. For urban areas, the priority is as shown in Table 6.

Priority	City Size
1	National Capital
2	Regional/State Capital
3	Cities with population over 250,000
4	Cities with population over 100,000
5	Cities with population over 20,000
6	All other

~~(U//FOUO)~~ Table 6. Urban Area Priority List

c. (U) Development. NSEs must be named distinctly with an assigned identification, e.g., Basic Encyclopedia (BE) number/O-suffix or Entity Identifier (EID), and classified by their functionality with an appropriate CATCODE in accordance with Enclosure F, reference f. Facilities must be geospatially defined as discrete entities with a geographic center and corner point boundaries derived using the most accurate source material available. They must be entered in MIDB as soon as possible to support verification by the appropriate authority and realistic target deconfliction during the conduct of combat operations. If required, CCMDs may request IC support for NSE development. Development of new nominations should be requested via the NOM-DCR process IAW subparagraph 2.c. below, with amplifying information provided via e-mail to the appropriate RAC. Requirements to support development of existing entities in MIDB should be submitted via Community On-Line Intelligence System for End Users and Managers (COLISEUM).

d. ~~(U//FOUO)~~ Coordinate Generation. Coordinates relating to physical NSEs are produced and maintained in MIDB. Accurate positioning of physical NSEs is essential for minimizing collateral damage and critical to the CDE process.<sup>10</sup> Since automated CDE tools depend on accurate plots of the NSL to ensure valid results, care must be exercised in the methods used to derive NSE locations. Coordinates derived from 5 meter controlled image base (CIB)®, 10 meter CIB®, and Uncontrolled National Technical Means (NTM) with Rapid Positioning Capability and Digital Terrain Elevation Data (DTED) are not accurate enough to provide reliable depictions using automated CDE tools (see Table 7). Coordinates should be used to cue and further refine No-Strike locations on imagery (Enclosure F, reference g). Orthorectified mono imagery

<sup>10</sup> Although related here in the context of NSEs as facilities, units, and geographic areas, the accurate identification and location of virtual NSEs (i.e., cyberspace elements) is just as important.

should be used whenever stereo imagery is not available. Sources for deriving positional data are listed in order, based on accuracy, in Table 7:

<b>Priority</b>	<b>Coordinate Source</b>
1	Digital Point Positioning Database (Stereo)
2	Multiple Image Geopositioning with National Technical Means (NTM) or commercial imagery sources
3	Precise Orthorectified Image Datasets
4	CIB® (1 meter (1m), followed by 5m, 10m)
5	Uncontrolled NTM with Rapid Positioning Capability

~~(U//FOUO)~~ Table 7. Sources for Deriving Positional Data

2. (U) New Nominations

a. (U) NSE information is likely to come from a variety of sources: CSAs, Services, Components, coalition partners, interagency partners, etc. Regardless of source, each stakeholder must nominate NSEs that need to be maintained in MIDB. Stakeholders must enter both graphic and textual data for each NSE. If stakeholders do not or cannot have access to MIDB, they must pass the required information to the appropriate Coordinator for data entry into MIDB.

b. (U) CCMDs must ensure active communication with NSE stakeholders. Otherwise, information stakeholders provide may be either incomplete or difficult to verify. To facilitate the positive identification, location, and verification of NSEs, CCMDs may utilize the JIACG, as well as command CSA and coalition partner liaisons. Commands must reach out to subordinate commands, allies, coalition partners, host nation, and the JIACG to refine NSE information and encourage stakeholder participation and feedback.

c. (U) DIA's MIDB and/or NPW Web-based portal are the approved method for nominating new possible NSEs. When doing so, agencies shall follow the NOM-DCR guidelines and procedures established within MIDB. As nominations are developed, agencies shall provide as much information as possible. Location and source of information is critical. Identify the entity by CATCODE or function code to ensure it is forwarded to the correct RAC. Agencies should ensure contact information in the MIDB profile is current. Despite the MIDB process outlined below, CCMDs can expect to receive information from interested parties by fax, phone, e-mail, or visits from stakeholders.

# ~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B

11 December 2015

d. (U) Important attributes in reporting potential new NSEs include but are not limited to: date of nomination, country, entity name, coordinates (suggested format DD.MM.SS.SSS/DDD.MM.SS.SSS) or location with GPS or priority 1, 2, or 3 coordinate sources (see Table 7) preferred using World Geodetic System 1984 Datum, coordinate accuracy, perimeter outline, number of personnel at the facility and work schedules (if known).

e. (U) Important attributes for reporting and/or nominating virtual NSEs include internet protocol or uniform resource locator addresses (or other uniquely identifying features in cyberspace) and the geospatial location of any physical systems or nodes that utilize the virtual network. Requestor provides point of contact, organization, e-mail address, phone, and fax telephone numbers for verification purposes.

ENCLOSURE D

COLLATERAL DAMAGE ESTIMATION (CDE) POLICY AND GUIDANCE

1. (U) Introduction

a. (U) The CDM encompasses the joint standards, methods, techniques, and processes for a commander to conduct CDE of kinetic weapons effects and mitigate unintended or incidental damage or injury to civilian or noncombatant persons or property or the environment. It assists commanders in weighing risk against military necessity and in evaluating proportionality within the framework of the joint operations planning process. In short, the CDM is a means to assist a commander to adhere to the LOW.

b. (U) The CDM is a balance of probability, statistical analysis, and operational art that produces a conservative characterization of the risk of collateral damage for commanders and decision makers. The science behind the CDM is limited by the quantity and reliability of collected and analyzed data sets and delivery uncertainties. Furthermore, the CDM cannot always account for the dynamics of the operational environment (OE). Targeting professionals, intelligence analysts, and operations personnel should employ their combined expertise, experience, and current intelligence to tailor the CDM to the specifics of the OE. Taken together, the CDM's science and art provide essential information that the commander uses in context with other factors

and sound judgment to weigh risks versus gains in determining if the effects to be created against a given target warrant the use of lethal means.

2. (U) General Guidance

a. (U) The CDM supports employment of conventional munitions across the range of military operations. It provides commanders with an understanding of weapon effects, incidental consequences, and mitigation techniques enabling more balanced, comprehensive judgments.

b. (U) The supporting technical data and processes of the CDM are derived from weapons test data, operational combat observations, and physics-based computer models which generate statistical results. All of these sources contain some degree of inherent variability. **The CDM product is an estimation of the outcome of weapon employment. The OE, weapon reliability, and fidelity of intelligence data are contributing factors that may account for a collateral damage estimate that differs from actual**

11 December 2015

**results.** Though the CDM follows a rigid process and generates estimated values, neither analyst nor commanders should be under the impression that these values in any way constitute ground truth, an exact science, or flawless data. CDE contributes to a commander's decision making.

c. (U) **The CDM and the products derived from CDE are not the only input to a commander's decision making. Operational objectives, end-state considerations, LOW, ROE, target characteristics, risk to friendly forces, and strategic risk are examples of the many factors that contribute to a commander's decision making. These factors, either alone or in combination, may outweigh the value of the CDM input.** This is not to say that collateral damage may not be an overriding issue depending on the OE at the time. Therefore, it is important that commanders, at all levels, who may be responsible for performing CDE, focus appropriate command attention and emphasis on CDE.

d. (U) Operation-specific ROE and other policy guidance issued by the SecDef and/or the POTUS will dictate decision authorities and collateral damage thresholds, to include the noncombatant and civilian casualty cutoff value (NCV). Thresholds are established consistent with the LOW, governing reporting requirements, and the delegated CDE responsibilities of strategic, operational, and tactical commanders. In the absence of SecDef/POTUS guidance, CDRs may issue their own thresholds in compliance with the LOW, military objectives and consistent with any other applicable national command guidance. Such CDR guidance is published in appropriate ROE or other orders.

e. (U) The CDM must be applied as exhaustively and thoroughly as possible relative to commander's guidance and operation-specific constraints. The CDM must also be sufficiently flexible to accommodate the pace and tempo of operations. Collateral damage estimates are perishable. Therefore, the CDM must remain responsive to changes in the OE, scalable for tactical through strategic application, and common enough for most geographic areas or regions of conflict.

f. (U) The CDM must be implemented consistently across all commands. Consistency minimizes confusion, maintains a joint standard, and provides commanders at all levels with a common construct and decision-making aid. Though commanders may explore and use innovative mitigation techniques, the following rules and limitations apply:

(1) (U) Collateral damage mitigation techniques not expressly authorized in this directive cannot be presented exclusively as part of a collateral damage estimate. At a minimum, every collateral damage estimate

11 December 2015

must use those mitigation techniques authorized in the CJCSI using the CER values and resulting CHAs derived from the supporting CER Reference Tables and guidance contained within the specified table notes.

(2) (U) A commander must be informed, either on a CDE graphical aid or verbally, of the assumptions, errors, and uncertainties accompanying the mitigation techniques employed, including the sources and fidelity of the supporting information. Information must comply with the minimum standards as prescribed in Enclosure F, reference h.

g. (U) Commanders apply the methodology, concepts, and outputs for planning fires at the operational or tactical level. The CDM has the flexibility to apply to time critical events and is designed to allow a trained CDE analyst to quickly produce an estimate.

(1) (U) The CDM is not intended to deny a commander the ability to respond to targets of opportunity, and should not be used as the sole justification to impede or delay fires on a legal military target.

(2) (U) **The CDM does not limit a commander's inherent right of self-defense under the LOW.** When the use of force in self-defense is necessary, including situations with troops in contact, the nature, duration, and scope of force should not exceed that which is required to respond decisively to hostile acts or demonstrated hostile intent.

h. (U) The CDM establishes a means of accommodating policy or other limitations, such as foreign partner sensitivities, that the U.S. government may impose upon its forces, beyond LOW legal requirements. The CDM improves the efficiency of operations and should not be construed as state practice with respect to customary international law. Similarly, no part of this methodology is meant to abrogate U.S. obligations under the LOW. Nothing in the CDM limits or increases the rights and obligations of any U.S. military commander or service member under the LOW.

i. (U) Lastly, this instruction directly supports the STAR process, which outlines the procedures for CCDRs to identify and characterize targets as "sensitive" and/or "CDE High."

(1) (U) CCDRs characterize targets as "sensitive" when the potential for damaging effects and/or injury to civilian or noncombatant property and persons, potential ensuing political consequences, or other significant adverse effects are estimated to exceed predetermined, situation-specific thresholds normally defined in the operation-specific ROE (see Enclosures G and the glossary for reference to a sensitive target).

(2) (U) The term “CDE High” applies to potential target engagements in which the CDE level is “5-High” based on the CDM. A CDE 5-High is attained when the CE is greater than the NCV as established in applicable ROE. All CDE 5-High targets are sensitive targets, but not all sensitive targets are CDE 5-High.

3. (U) Collateral Damage Estimation Methodology (CDM) and Collateral Objects

a. (U) Facilities/Elements in General. Do not disregard any facility or element of a facility in collateral damage analysis, regardless of square footage, unless the facility is clearly uninhabitable (e.g., walls surrounding a roof-based water cistern, animal pens, buildings with no roof, dilapidated shacks). Current intelligence or “ground truth” may aid this determination.

(1) (U) If time permits, a trained imagery analyst will make the determination as to habitability and functionality of the facility in question.

(2) (U) Imagery Analysis. Imagery and/or CDE analysts should employ their combined expertise, experience, and current intelligence (e.g., pattern of life data) to tailor the science to the specifics of the OE and annotate on the CDE graphic operational status and use (i.e., dry or not, private or public) of canals, waterways, wells or other similar collateral objects, if applicable for proper risk assessment to the commander.

(3) (U) Facility Assessment. For facilities with more than one aimpoint, the overall target facility CDE equals the highest aimpoint evaluation, after aimpoint promotion. For example, a target facility has three aimpoints: one aimpoint is determined as CDE 2 Low; a second aimpoint is determined as CDE 3 Low; and the third aimpoint is determined as CDE 4 Low. The target’s overall estimate is CDE 4 Low. When weaponeering solutions differ for each aimpoint, individual aimpoints may be evaluated independently and presented in the final CDE.

b. (U) Cemeteries. Cemeteries are CAT I NSEs. Cemeteries are analyzed as outdoor extensive facilities using the appropriate CDE Level 3 CER based on weapon fuzing due to their vulnerability to fragmentation and crater ejecta. In cases where current intelligence is capable of providing a more refined estimate of population density for a specific collateral concern, that data should be employed in the casualty estimate for all cemeteries within the predicted CHA. All efforts should be made to determine the pattern of life for cemeteries on a case-by-case basis. Pattern of life data should be documented when there is a zero casualty estimate.

c. (U) Tents. If observed in the target area, tents will be accounted for when conducting CDE. Tents made of unknown material, canvas or similar material are analyzed as outdoor facilities using the appropriate CDE level 3 CER based on weapon fuzing due to their vulnerability to fragmentation and secondary debris or crater ejecta. In cases where current intelligence is capable of providing a more refined estimate of population density for a specific collateral concern, that pattern of life data should be employed in the casualty estimate. When it is not possible to establish pattern of life for planning purposes, apply functionality population density values for "single family village or rural scattered, lower class" residential.

d. (U) Power Lines. Electrical transmission lines (ETLs) (e.g., significant electrical towers) that transport electricity for civilian consumption are CAT II NSEs regardless of size. Do not discount ETL in collateral damage analysis unless otherwise directed by appropriate ROE. ETLs are mitigated to CDE 4 Low using the unknown structure type CER in the CDE 4 table. If the weapon effects cannot be mitigated, the resulting evaluation is CDE 5 Low, assuming there are no other collateral concerns affecting the estimate.

e. (U) Borders. A sovereign country's border without a fence, wall, barrier or other supporting infrastructure is not a NSE. During target engagement, if weapons effects cannot be mitigated cross-border due to proximity to the border, the target is categorized a "Sensitive Target" and must be approved IAW the STAR process and applicable ROE.

f. (U) Man-Made Waterways

(1) (U) Aqueducts, navigable canals, large water supply or drainage canals, distributary canals and Karez systems are CAT II NSEs and are further classified as infrastructure. Moderate to small sized (less than 3 meters in width) irrigation canals or ditches are classified as minor irrigation works and are neither considered infrastructure, nor required to be accounted for in the collateral damage analysis.

(2) (U) Canals and waterways are not "outdoor" collateral facilities for casualty estimate purposes. Local populace use of the canal or waterway is transient in nature. Transient means mobile. Commanders should use their discretion, experience, and current intelligence, to include pattern of life data, to determine daytime and nighttime population density norms for affected canals or waterways.

(3) (U) Above-Grade Waterways

11 December 2015

(a) ~~(U//FOUO)~~ If an above-grade canal (does not include minor irrigation works) is engaged directly, the commander is responsible for determining the predominant function based on current intelligence and characterizing the target as dual-use or not dual-use. If the target has the potential of causing an environmental hazard, weaponize the target to create the desired effect and provide the weaponizing solution for a Naval Oceanographic Office (NAVO) assessment. In addition, the presence of an environmental hazard may elevate the target to the STAR process even if the collateral damage estimate is low due to the environmental risks and expanding the effects of the conflict. The environmental damage estimate for an above-grade canal is not intended to deny a commander the ability to respond to targets of opportunity and should not be used as the sole justification to impede or delay fires during target engagement.

(b) (U) If the above-grade canal is not engaged directly, dual-use determination and NSL removal is not required. If the above-grade canal or waterway is dry, but subject to seasonal conditions, it is still an NSE and risk should be characterized accordingly. Above-grade canal or waterway collateral objects are mitigated according to the paragraphs below.

1. (U) An above-grade canal is mitigated using the unknown structure type CER in the CDE Level 4 tables.

2. (U) If the above-grade canal falls within the CDE Level 4 CER, additional analysis is conducted. CDE analyst may use 1/2 of the CDE level 4 CER (inside the inner-annulus). If the canal falls in the outer half of the CER (outside the inner-annulus), the target is analyzed as CDE 4 Low.

a. (U) An inner and outer annulus is formed by dividing the value of the applicable CER in half to create an inner and outer ring.

b. (U) The outer annulus extends from the outer edge of the applicable CER up to and including the one-half value. Inside of the one-half CER is the inner annulus.

3. (U) The target will remain a CDE 4 Low if the above-grade canal is in the outer half (outside the inner-annulus) of the CDE level 4 CHA. If the above-grade canal falls within the inner half of the CDE level 4 CHA (inside the inner-annulus), the target is determined to be CDE 5 Low pending further analysis. Additionally, an environmental damage estimate is required to analyze whether the target is sensitive.

4. (U) Weapons below the 500-pound class do not need analysis due to minimal explosive weights. For weapons in this category, if an above-

# ~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B

11 December 2015

grade canal falls inside the CDE level 4 CHA of this weapon class, the target is analyzed CDE 4 Low, assuming there are no other collateral objects affecting the estimate.

(4) (U) Below-Grade Waterways. Water control features associated with below-grade canals are the only component of a below-grade canal that requires collateral damage analysis.

(5) (U) Karez Systems. Karez systems are not considered in collateral damage Level 1-3 analysis because they will remain unaffected by the fragmentation and ejecta effects of the weapon. Karez systems at CDE 4 and above are mitigated as per guidance for above-grade canals.

4. (U) Mitigation Techniques. The CDM considers five mitigation techniques. Some of these techniques are built into the methodology as required restrictions; however, other mitigation techniques may be employed given the physical orientation of the target and collateral objects. Any additional mitigation techniques will be applied in accordance with the guidance prescribed in this instruction (see Table 8).

Consideration	Delay Fuzing/ Bomb Burial <sup>1</sup>	VT Fuzing/ Air Burst <sup>2</sup>	Shielding <sup>3</sup>	Delivery Heading <sup>4</sup>	Aimpoint Offset <sup>5</sup>
Fragmentation	X	N/A	X	X	X
Blast	X	X	X	N/A	X
Debris	N/A	X	X	N/A	X
Penetration	N/A	X	N/A	N/A	N/A
Thermal	X	N/A	X	N/A	N/A
Delivery Error	N/A	X	N/A	X	N/A
Notes:					
1 -- Delay Fuzing that achieves 100% warhead burial in the ground or internal detonation within a target structure provides the best mitigation for fragmentation and blast and may minimize thermal effects. Thermal effects should be considered when planning attacks on targets that present a high thermal sensitivity (i.e., wood structures, gas tanks).					
2 -- Variable Time (VT) Fuzing that achieves an above ground/air burst detonation mitigates blast and debris effects, eliminates penetration effects and minimizes risk of delivery error.					
3 -- Shielding of collateral structures from fragmentation, blast, debris and thermal effects may be achieved by the presence of other structures, walls, vegetation, and terrain features.					
4 -- Delivery Heading can mitigate fragmentation effects and minimize risk of delivery error. Testing has demonstrated that most fragmentation effects occur toward the front half of blast and fragmentation warheads.					
5 -- Aimpoint Offset may mitigate fragmentation, blast, and debris effects when using precision guided munitions (PGMs). In some cases, applying aimpoint offset allows employment of larger warheads that create the desired effect and mitigate collateral damage.					

Table 8. (U) CDM Mitigation Techniques

a. (U) Delay Fuze/Warhead Burial. Delay fuzing for complete warhead burial prior to detonation is a very effective technique for mitigating warhead

11 December 2015

fragmentation and thus reducing the risk of collateral damage. However, warhead burial prior to detonation produces a significant secondary debris hazard from the material ejected from the resulting crater. This debris hazard prescribes the mitigated values in the CDE Level 3 PGM CER Reference Table. Warheads contained in the CDE Level 4A PGM CER Reference Table, with exceptions as noted within the table, are restricted to delay fuze settings to achieve either complete warhead burial below grade or complete burial within a target structure prior to detonation to mitigate the primary fragmentation effects of the warheads. Warhead burial reduces the risk of serious or lethal injury to unprotected civilians and noncombatants in the vicinity of the target. Warheads contained in the CDE Level 4B Air-to-Surface Unguided Munition (ASUGM) CER Reference Table are also restricted to delay fuze settings to achieve complete warhead burial below grade prior to detonation to mitigate the primary fragmentation effects of the warheads. Surface-to-Surface Ballistic Munitions (SSBMs) currently have no delay fuze capability that will achieve complete warhead burial. **Caution should be taken when employing this mitigation technique to ensure the desired targeting effect is not compromised.**

b. (U) Variable Time (VT)/Proximity Fuze. Fuzing for an air detonation is an effective technique for mitigating the blast effects of warheads and reducing collateral risk to structures. However, the technique presents increased risk to unprotected civilian or noncombatant personnel as the fragmentation pattern is optimized. This mitigation technique is highly recommended in CDE Level 4 for SSBMs for two reasons. First, the assumption in CDE Level 4 is that the civilian and noncombatant population will seek cover in structures, thus protecting them from the fragmentation effects of warheads. Second, SSBMs are area fire weapons susceptible to inherent delivery error. As a result of VT fuzing, there is a reduced risk of penetrating the structure and violating the protection afforded to the civilians and noncombatants inside.

c. (U) Delivery Heading Mitigation. Limiting the delivery heading of warheads is an effective technique for mitigating the risk of collateral effects caused by range delivery error and predominant lethal effects. Weapon testing has revealed the majority of lethal effects occur in the forward quadrants of warhead detonation along the delivery heading (between 270 and 90 degrees relative to warhead detonation). The lethal effects include both fragmentation and secondary debris from the target. Therefore, delivery heading mitigation is considered during the CDE Level 4 process.

(1) (U) PGMs: Heading recommendations may be provided for PGMs; these recommendations are optional. If provided for PGMs, delivery headings should be directed on an axis parallel and away from the collateral objects located within the applied CER of the planned weapon. In instances when a

11 December 2015

CDE analyst derives a heading recommendation, they should strive to provide a minimum of 30 degrees for attack heading window.

(2) (U) SINGLE ASUGMs: Heading recommendations may be provided for single ASUGM deliveries (optional), but target threat layout may limit heading mitigation options at the point of execution. Aircrew must remember, the impracticality of overflying targets area threats does not discount the resultant weapons effects created in the target area. In instances when a CDE analyst derives a heading recommendation, they should strive to provide a minimum of 30 degrees for attack heading window.

(3) (U) MULTIPLE ASUGMs: Heading restrictions for multiple ASUGMs are derived early in the weaponeering process utilizing JWS and are reflected in the CDE analysis beginning at CDE level 3.

(4) (U) SSBMs: Gun Target Line (GTL) recommendations may be provided for SSBMs (optional), but limited mobility of SSBMs may limit GTL mitigation options at the point of execution. Commanders must remember, the impracticality of moving surface based fire systems does not discount the resultant weapons effects created in the target area. In instances when a CDE analyst derives a GTL recommendation, they should strive to provide a minimum of 30 degrees for the GTL window.

(5) (U) **Delivery heading mitigation may be impractical at the point of execution due to threats or other conditions in the target area.** In these cases, command policies, ROE, and target sensitivity will dictate the decision to forgo the delivery-heading recommendation, re-weaponeer the target, create effects on the target via other means, or abort the mission

d. (U) Shielding. Intervening structures, significant vegetation, and, in some very rare cases, terrain may shield collateral objects from weapon effects. Shielding has proven a very effective technique for mitigating warhead fragmentation, blast, and debris. However, shielding can only be employed when an entity or significant terrain capable of shielding a warhead's effects is located between the intended aimpoint and a collateral object.

(1) (U) Shielding is conditional on the target's presentation in the physical environment and is used in determining a CE.

(2) (U) CDE analysts may use JTCG/ME accredited tools that make use of known features in the environment and specific weapon engagement parameters to determine effects of shielding and adjust the casualty estimate. Manual evaluation is also authorized.

11 December 2015

e. (U) Aimpoint Offset. In some instances, depending on the target's composition, size, and the desired effect, the aimpoint may be altered or moved to a location whereby the associated CER and resulting CHA no longer affect a collateral object. **Caution should be taken when employing this mitigation technique to ensure that the desired effect is not compromised by offsetting the aimpoint.** Like shielding, this final mitigation technique is conditional on the target's presentation in the physical environment and is not built into any of the levels of the CDM. However, aimpoint offset should be considered between CDE Levels 4 and 5, if appropriate.

5. (U) Collateral Damage Estimation Methodology (CDM) Limitations and Exclusions

a. (U) **This CDM is not applicable to nuclear or IRCs.** In future updates, a CDM may account for those capabilities. Until then, see Appendix A to Enclosure B and follow CCMD/SecDef guidance for targeting with these capabilities.

b. (U) **CDE as specified in this instruction is not required for surface-to-surface direct fire weapon systems** (e.g., 120mm cannon on M1 Main Battle Tank, 25 mm Bushmaster, M-2 .50 Caliber Machinegun), **rotary-wing or fixed-wing air-to-surface direct fire weapon systems less than or equal to 105 mm** (e.g., 2.75 in rockets, M2A1 40 mm Bofors, GAU-8 30 mm Gatling gun, GAU-4 20 mm Gatling gun, and the M137A1 105 mm). The risk of collateral damage from these weapon systems is presented by the distribution of munitions in the target area and not from the explosive effects of the warhead. The LOW concepts of necessity, distinction, proportionality, and unnecessary suffering are considered for employment of direct fire weapon systems.

c. (U) **The CDM does not account for weapon malfunctions, unknown delivery errors, or altered delivery tactics based on operator judgment.** The CDM assumes weapons will function as designed, including guidance systems, and will be delivered to achieve the desired effects.

d. (U) **The CDM does not account for unknown transient civilian or noncombatant personnel and/or equipment in the vicinity of a target area.** This includes cars passing on roads, people walking down the street, or other civilian entities whose presence in the target area cannot be predicted to reasonable certainty. Pattern of life analysis should be conducted to identify assemblies of civilian or noncombatant personnel and/or property in the target area and deconflict target engagements when possible.

11 December 2015

e. (U) **The CDM does not account for individual marking or adjusting rounds when employing SSBM in the Observer Adjusted (OA) method of engagement.**

f. (U) **The CDM does not account for the use of cluster or improved conventional munitions (ICM) beyond CDE Level 3** because of the greater risk of unexploded ordnance and the limited weaponeering options available to mitigate the risk of collateral damage with these munitions.

g. (U) **Unguided Rocket Assisted Projectiles (RAPs) or enhanced/extended range artillery, mortar, and naval gun munitions are not addressed beyond CDE Level 3** due to the considerable increase in ballistic errors associated with these munitions and the significant increase in risk associated with their use in urban areas.

h. (U) **The CDM does not account for secondary explosions.** Collateral damage due to secondary explosions (i.e., weapons cache or fuel tanks for military equipment) cannot be consistently measured or predicted. Commanders should remain cognizant of any additional risk due to secondary explosions.

i. (U) While the CDM can be applied to any geographic region, weapons effects may vary in different environments. In general, the CDM and supporting weapon effectiveness data use a combination rolling terrain and soft soil as the base environment and terrain. Detonation in flat open terrain can have a significantly higher CER than those published in the CDE tables. Desert and jungle environments, as well as those with hard soil, for instance, may present conditions that change weapon effects. Commanders should consider unique environmental conditions and terrain features along with any analysis from the CDM.

j. (U) The CDM is not applicable to live-fire training events, whether located on or off an approved range. In either case, service-specific range regulations and peacetime training risk mitigation apply. CDM and its underlying assumptions are built to support wartime targeting objectives and accept a greater level of risk than acceptable for training.

~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

~~UNCLASSIFIED//FOR OFFICIAL USE ONLY~~

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## ENCLOSURE E

### JOINT COLLATERAL DAMAGE ESTIMATION METHODOLOGY (CDM)

#### 1. (U) Collateral Damage Estimation Methodology (CDM) Overview

a. (U) Introduction. The technical methods detailed in the CDM enable a reasonable determination of collateral damage inherent in weapons employment. The CDM thereby addresses the LOW requirement for feasible precautions to minimize effects of combat on the civilian or noncombatant population. The supporting technical data, mitigation techniques, and logic of the CDM recognizes the limitations of what can reasonably be known about a given target, its surroundings, and collateral structure composition; the fidelity of available weapon's empirical data; and the operational realities and uncertainties of ordnance delivery in a combat environment.

b. (U) The Collateral Damage Estimation Methodology (CDM) is Simple and Repeatable. The steps outlined in Appendices A through E of this enclosure are designed so that the CDM can be used in a deliberate manner where time is not a factor, or in situations where time is critical. In addition, the methodology and supporting data tables can be used with or without the aid of an automated CDE tool.

c. (U) Elements of the Technical Framework. The framework of the CDM is built around five mutually dependent CDE Levels (CDE Levels 1 through 5). Each level is based on a progressively refined analysis of weapon effect, the physical environment, target characteristics and delivery scenarios with specific risk thresholds established for each of the five CDE levels.

(1) (U) Beyond the first level, the CDM assigns subgroupings: "A" for Precision Guided Munitions (PGM); "B" for Air-to-Surface Unguided Munitions (ASUGM); "C" for Surface-to Surface Ballistic Munitions (SSBM).

(2) (U) At each CDE level, an estimate of either low or high is produced. If collateral objects are not within the computed CHA, the estimate is low and a higher CDE level is not needed. If a low estimate is rendered, the methodology supports engagement of the desired target with the conditions and restrictions specified by the CDE level where the low estimate was determined. If collateral objects are within the CHA or the specified level of risk to collateral objects is exceeded, the estimate is high; perform the next CDE-level analysis.

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

d. (U) Risk and the Collateral Damage Estimation Methodology (CDM).

**The CDM helps commanders balance the dynamic relationship between three principal categories of risk: risk to mission, risk to forces, and risk of collateral damage.** The intersection of the three is determined by the weaponeering restrictions required to reduce collateral damage to an acceptable level while achieving mission success and minimizing operational risk to forces. CDM provides commanders with a risk assessment to collateral entities based on the weaponeering done to achieve effects on a target. As the CDM progresses up through each CDE level, the number of weaponeering restrictions increases, elevating the potential risk to friendly forces and mission accomplishment. The elevation in risk is based on the intersection of restrictions and potential threats in the target area. Figure 1 depicts the risk continuum and the interaction between collateral damage and weaponeering restrictions for each CDE level. CDE analysts must account for or work with weaponeers to ensure mitigation techniques intended for reducing the CHA do not compromise mission accomplishment.

e. (U) Collateral Damage Thresholds. The outputs of the CDM provide commanders with easily recognizable measures of operational risk quantified by the CDE level required to achieve a final collateral damage estimate. The collateral damage threshold in CDE Levels 1, 2, and 3 mitigates risk to less than 10-percent probability of serious wounds from fragmentation or other primary damage mechanism to standing unprotected personnel dressed in a summer-weight uniform on open rolling terrain. The collateral damage threshold in CDE Level 4 is less than 1 percent fractional structural damage to collateral structures from primary warhead blast effects. CDE Level 4 imposes the specific requirement to fuze the warhead to detonate either in the target structure or below ground, which mitigates fragmentation effects by using the building or ground to absorb fragments. Of note, injury to personnel remains the primary concern in CDE Level 4. The link between personnel and structures from a collateral damage perspective is the assumption that noncombatants in structures are predominantly injured or killed by blunt trauma from structural collapse and secondary debris. The effects of blast induced debris have not been characterized; of note, blast induced debris has been operationally observed to be a significant hazard to noncombatant personnel.

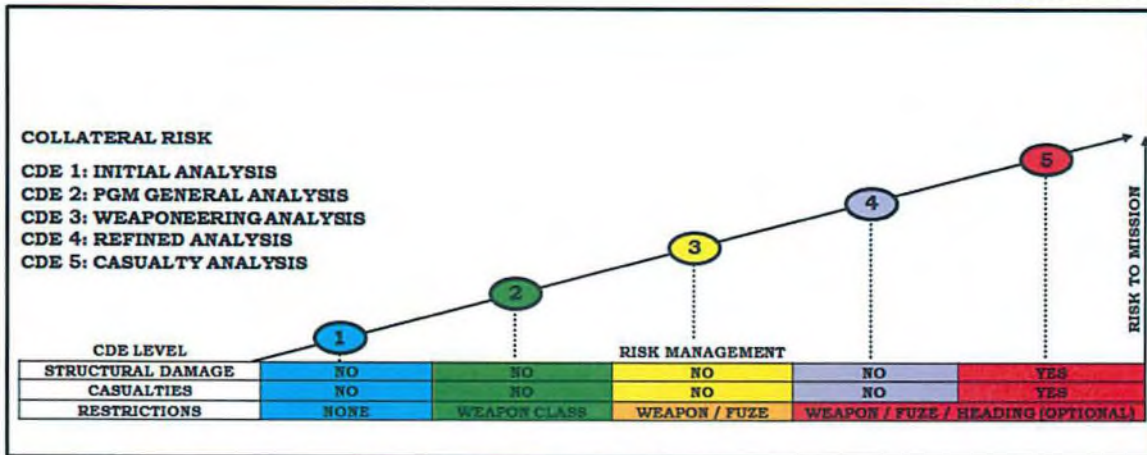


Figure 1. (U) Risk and the Collateral Damage Estimation Methodology

f. (U) Components of the Collateral Damage Estimation (CDE) Levels. CER and CHA are two fundamental elements of the CDM that determine the progression from each CDE level.

(1) (U) Collateral Effects Radius (CER). A CER is a radius representing the collateral hazard distance for a given warhead, weapon, or weapon class considering predetermined, acceptable collateral damage thresholds established for each CDE level. A CER value contains the total error associated with a specific munition and method of employment as well as the radius of dominant warhead effects. For cluster or ICM, the CER value includes the pattern radius of the sub-munitions.

(2) (U) Collateral Hazard Area (CHA). A CHA is formed by measuring a CER from either the edge of a target/element outline, the aimpoint for a point target, the edge of an engagement zone or artillery sheaf, or the edge of a target area outline for an area target. A CHA may also be formed by accurate predictive models designed to illustrate plumes, flooding, fire, or distribution/spillage of hazardous wastes for CE.

(3) (U) The CER is used to form the CHA. The analysis conducted at each CDE level is based on determining the existence of collateral objects within the corresponding CHA. Within a CHA, there is an unacceptable probability for damage or injury to collateral objects. Each succeeding CDE level employs mitigation techniques and weaponing restrictions designed to reduce the CHA to an acceptable level whereby no collateral objects exist within the CHA. Figure 2 illustrates the CER/CHA relationship.

g. (U) Moving Targets. CDE analysis for moving targets is handled the same as for fixed targets in that if the distance from the target to the nearest

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

object at the time of weapon detonation is greater than or equal to the applicable CDE level CER, the CDE is Low for that level. Conversely, if the distance from the target to the nearest collateral concern at the time of weapon detonation is less than the applicable CDE level CER, the CDE is High for that level. Despite this fundamental consistency in the analysis of fixed and moving targets, there are additional considerations for moving targets.

(1) (U) In CDM several assumptions are made with respect to engaging moving targets.

(a) (U) Between weapon release and weapon detonation, the weapon aimpoint is updated dynamically in response to target maneuvers.

(b) (U) The weapon's Total Error 90 (TE90) about the final intended point of impact is not significantly greater than that weapon's TE90 for a fixed target (i.e. the weapon has sufficient energy and maneuverability to guide to the target). The CER Reference Tables assume TE90 for a fixed target.

(2) (U) There is inherently greater risk when engaging moving targets since the target's location at the time of weapon function cannot be known with absolute certainty. Variables include the weapon time of flight, time between strike clearance and weapon launch, and target speed and maneuver. Therefore, in order to render a CDE Low determination for a moving target, an appropriate amount of conservatism must be used in considering the aforementioned variables to determine with reasonable confidence that the target will not be closer than the applicable CDE level CER to a collateral object at weapon function.

(3) (U) For the purpose of fragmentation mitigation, moving targets are not considered "substantial structures".

(4) (U) Typically CHAs are formed by measuring a CER from either an aimpoint (for a point target or a moving target) or the edge of a target/element outline. There is another permissible approach for moving targets to aid in CDE. By measuring a CER from the edge of collateral objects in the vicinity of an anticipated or possible target route, an area is created that if the target were to be struck within, would require a High determination for that CDE level. Alternately, if reasonably confident the target will be outside these areas at weapon function, the CDE determination would be Low.

h. (U) Warhead Effects in the Collateral Damage Estimation Methodology (CDM). The maximum effects distance, based on probability of damage or injury was developed for each warhead contained in the CER Reference Tables. These include considerations for primary blast, fragmentation, crater ejecta,

and blunt trauma from building collapse using damage criteria appropriate for each CDE level.

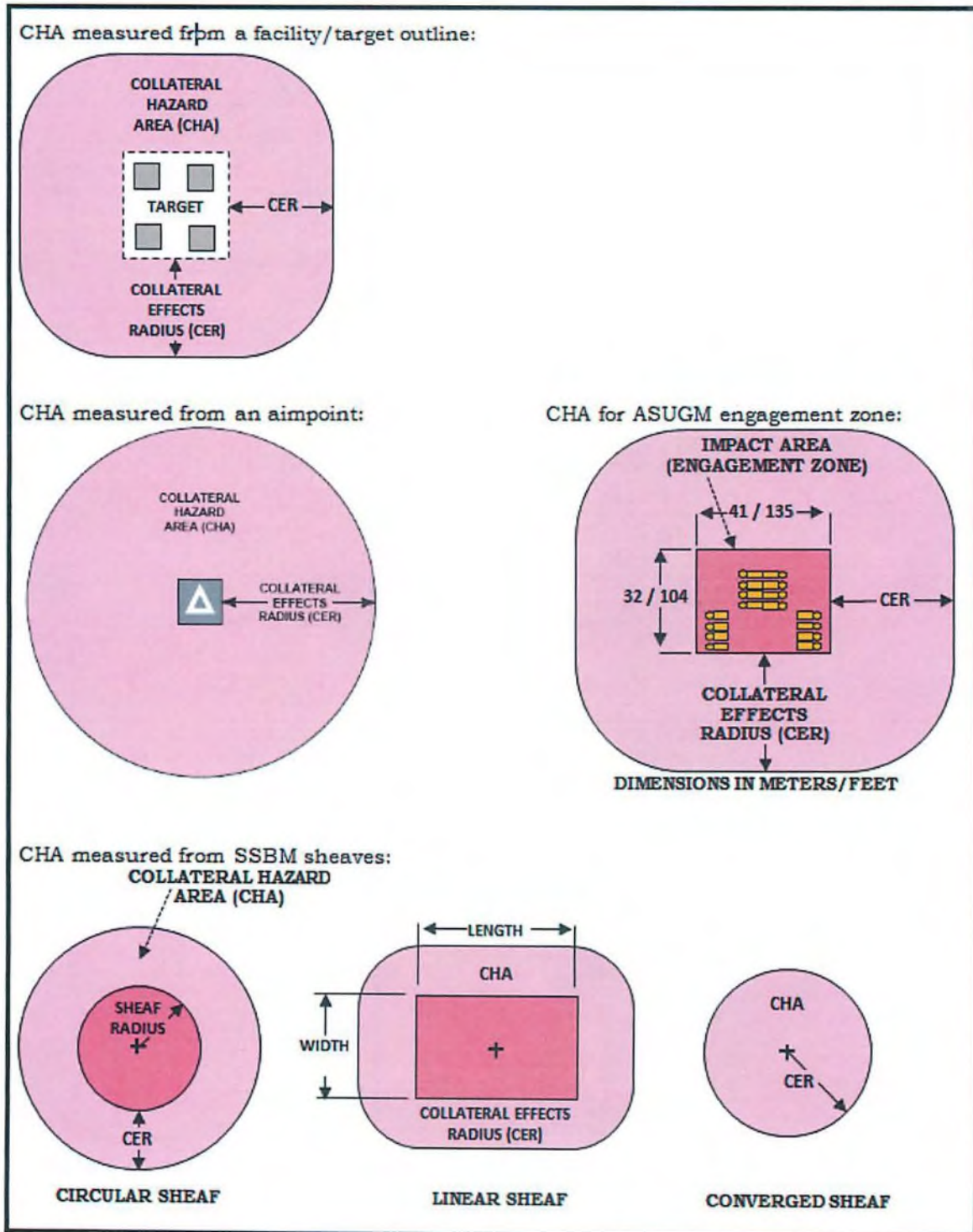


Figure 2. (U) CER/CHA Relationships

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

i. (U) Types of Error Used in the Collateral Damage Estimation Methodology (CDM). The CDM and supporting CER Reference Tables involve three primary categories of error: delivery error, target location error, and total error.

(1) (U) Delivery error correlates to the accuracy of the guidance system or delivery aircraft, depending on the weapon employed, and is expressed in terms of circular error. Circular Error 90 (CE90) is the radius of a circle in the ground plane in which 90 percent of munitions are expected to impact around an aimpoint.

(2) (U) Target location error (TLE), composed of both circular and vertical errors, is the error associated with locating the true position of the target. Specifically, TLE90 describes the radius of a circle in the ground and vertical planes centered on the target coordinates such that 90 percent of the time the true target location is within that circle.

(3) (U) TE90 is the root sum square of the CE90 and the TLE90.

j. (U) Cluster and Improved Conventional Munitions (ICM) Pattern Radius. Worst-case pattern radii have been developed for each weapon, capable of dispensing sub-munitions, contained in the CER Reference Tables, based on operationally representative delivery conditions. The worst-case radii are combined with individual submunition warhead effects radius and TE90 to produce CER values appropriate for each CDE level.<sup>11</sup>

k. (U) Collateral Effects Radius (CER) Reference Tables. To support CDE, JTCG/ME produces CER Reference Tables annually. Additionally, new weapon values are produced and accredited as required. JTCG/ME maintains the tables on its SIPRNET Web page (<https://jtcg.amsaa.army.smil.mil/jpias/index.html>). Users must request access via the site as the tables are password protected. When new tables are developed, Joint Staff Targeting notifies DoD components via official message. Problems obtaining new tables on the Web site should be directed to your command or next higher echelon targeting office/directorate/division. Representatives from foreign governments supporting combined operations, or planning with the U.S. should contact their local U.S. DoD representative.

(1) (U) CER Reference Tables are tailored for each CDE level, considering collateral objects, the weapon capabilities, and limitations of each munition addressed in the tables. The tables represent the range of collateral

---

<sup>11</sup> Some weapons have noted exclusions in the CER Reference Tables.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

weapon effects, measured from a warhead detonation, for each conventional munition in the U.S. inventory. CER reference table values are rounded up to allow for simplicity of operational use and a conservative estimate.

(2) (U) Below is a list of the CDE levels with their corresponding CER reference tables:

CDE Level 1: Initial Analysis

- CDE Level 1 CER Reference Table

CDE Level 2: PGM General Analysis

- CDE Level 2A PGM CER Reference Table

CDE Level 3: Weaponing Analysis

- CDE Level 3A PGM CER Reference Table
- CDE Level 3B ASUGM CER Reference Table
- CDE Level 3C SSBM CER Reference Table

CDE Level 4: Refined Analysis

- CDE Level 4A PGM CER Reference Table
- CDE Level 4B ASUGM CER Reference Table
- CDE Level 4C SSBM CER Reference Table

(3) (U) Appendix G to this enclosure summarizes the intended use for each reference table, the dominant hazard used in calculating the CER, the threshold criteria, and any associated weapon restrictions.

1. Nearest, Weakest, or Multiple Collateral Objects. The nearest collateral object generally is used to drive the CDM. In most cases this approach is valid because collateral structures located in the vicinity of a target are similarly constructed. However, there will be instances when construction types of nearby collateral structures vary greatly and an analyst may need to consider the weakest, not the nearest, collateral structure. In these cases, the weakest collateral structure is used to determine a single CER value for each aimpoint. This approach produces a conservative CDE Level 4A CER value for each aimpoint and may include collateral objects not normally considered at CDE Level 4. Another technique is to characterize each collateral structure near a target developing multiple CHAs and determine the risk of collateral damage to each of the collateral structures. While this method is more time consuming, it would tend to give a more refined casualty estimate for CDE Level 5. **The CDE analyst must consider the current ROE and policies when analyzing the target area and use the method that most accurately reflects the situation at hand.** Realize that when using weaker structures, a higher casualty estimate in CDE Level 5 could result (more conservative approach), whereas if

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

the stronger building type were used, a lower casualty estimate might result (less conservative approach). **Either way, the analyst needs to be consistent in the technique used, note all assumptions used when briefing the commander on the collateral damage estimate, and include those assumptions in the electronic target folder.**

## 2. (U) The Five Basic Questions of the Collateral Damage Estimation Methodology (CDM)

a. (U) Introduction. In its most basic form, the CDM centers on five simple questions that must be answered before engaging any target:

(1) (U) Has PID of the target been established?<sup>12</sup>

(2) (U) Are there protected or collateral objects, including civilian or noncombatant personnel, human shields (involuntary, unwitting, or status unknown), virtual shields, CBR plume hazards, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target?

(3) (U) Can I mitigate damage to those collateral objects by engaging the target with a different weapon or with a different method of employment, yet still accomplish the mission?

(4) (U) If not, how many civilian and noncombatant casualties do we think the attack will cause?

(5) (U) Are the collateral effects of my attack excessive in relation to the expected military advantage gained and do I need to elevate this decision to the next level of command to attack the target based on the ROE in effect?

3. (U) **Field Collateral Damage Estimation (CDE)**. Field CDE is typically used in dynamic targeting when there is a time-constrained opportunity to engage a target. Field CDE differs from Formal CDE, which is conducted by certified CDE analysts, typically in a joint operations center, air operations center or tactical operations center. Field CDE is typically conducted by Joint Terminal Attack Controller (JTACs), forward observer (FOs), or by aircrew. **Field CDE is a degraded mode of CDE, and creates the opportunity for increased risk.** A Field CDE will typically be a verbal call, and should be documented for future review/analysis. CCDRs will establish authorities for Field CDE, as necessary. When authorizing Field CDE, commanders should

---

<sup>12</sup> Operational feedback indicates that most collateral damage incidents result from target misidentification.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

ensure Field CDE utilizes existing concepts and reference tables derived from the CDM, and that somebody in the Field CDE fires approval chain is a certified CDE analyst. Typically, CDE Level 4 analysis is not authorized for Field CDE.

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-10

**UNCLASSIFIED**

Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX A TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 1 INITIAL ANALYSIS

#### 1. (U) Collateral Damage Estimation (CDE) Level 1 Initial Analysis Overview

a. (U) CDE Level 1 is the most important and complex step in the CDM. The information gained during CDE Level 1 is required to accomplish the remaining steps of the methodology. CDE Level 1 analysis answers the first two questions: “Has PID of the target been established?” and “Are there protected or collateral objects, including civilian or noncombatant personnel, human shields (involuntary, unwitting, or status unknown), virtual shields, CBR plume hazards, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target?”

b. (U) CDE Level 1 evaluates the target’s functionality for dual-use concerns, identifies potential CBR plume and environmental hazards, and identifies all collateral objects within the CDE Level 1 CER (resultant CHA). This step reveals those targets or collateral objects that may represent areas of strategic risk and therefore may also have to be evaluated via the STAR process (see Enclosure F, reference a).

(1) (U) CDE Level 1 is supported by the CDE Level 1 CER Reference Table. The CDE Level 1 CER Reference Table provides a single CER that includes the effects from any non-nuclear kinetic weapon in the U.S. inventory.<sup>13</sup> The CDE Level 1 CER is used to form the coarsest CHA by using the CER as a radius measured from the edge of the outline drawn around the entity selected for engagement, or from an aimpoint for point targets.

(2) (U) The resultant CHA becomes the primary search area for the identification of collateral objects near a target. Targets determined as CDE 1 Low present the lowest probability of collateral damage and have no tactical restrictions on execution, thus presenting the least risk for the commander. Targets determined as CDE 1 High present a greater probability of collateral damage and require further analysis.

2. (U) Collateral Damage Estimation (CDE) Level 1 Initial Analysis. CDE Level 1 analysis begins with examining the target’s nature, use, purpose, location and its surrounding environment. CDE Level 1 Initial

---

<sup>13</sup> Exceptions are noted in the CDE 1 CER Reference Table

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Analysis is an eight step process.

a. (U) Step 1: PID. The first and most important step in CDE Level 1 analysis is PID of the target. PID is an identification derived from observation and analysis of target characteristics including visual recognition, electronic support systems, non-cooperative target recognition techniques, identification friend or foe systems, or other physics-based identification techniques, or human identity-based biometric data collection devices. PID is done during target development and again prior to target engagement. While it is not a CDE analyst's responsibility to accomplish target PID, the analyst should confirm PID has been accomplished to ensure the CDE analysis begins with the correct target or target element. Lack of PID stops the CDE process.

b. (U) Step 2: Define Target Outline. The next step is to define target location, outline and functionally characterize the target elements. Target location is vital to define since it is an important factor in determining the RESPROD, applicable authorities, and ROE. If a conflict between BE numbers/O-suffixes exists for the same area, the RESPROD and other analysts that work the specific area will resolve any issues. For facilities, target location is defined and recorded as the geocoordinates of the facility's center mass. Geospatially define the target by annotating the target/element outline or target area outline on a target graphic. If the target is a point target, a target/element outline and target area outline are not necessary. An image of the facility, annotated to distinguish it from surrounding facilities and environment, is also required. This is normally accomplished through imagery analysis; however, if imagery is not available, commanders should use the best resources available to geospatially separate the valid military function of the target from its civilian/noncombatant surroundings. Additionally, it is important to identify and functionally characterize the target's elements. This identifies elements whose engagement supports attainment of the commander's objectives and avoids targeting NSEs sometimes located on combatant installations and facilities.

c. (U) Step 3: Authorized by ROE. The third step in initial analysis is to confirm the target is a valid military target and meets the objectives and criteria outlined in the commander's guidance. Target validation reviews the individual target's compliance with the commander's objectives and guidance, LOW, and ROE. Lack of confirmation that the target is a valid military target, stops the CDE process.

d. (U) Step 4: Dual-Use Target. The fourth step is Dual-Use Analysis. Following confirmation the target is a valid military target, determine if the target also serves a civilian/noncombatant purpose. Enclosure B provides definitions and treatment of dual-use targets. If the target is functionally

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

characterized as dual-use, then initiate intelligence analysis to estimate the population density of the target, as all dual-use targets require CDE Level 5 analysis.

e. (U) Step 5: Form CHA. The fifth step is to form the CDE Level 1 CHA around the target based on the values in the CDE Level 1 CER Reference Table.

f. (U) Step 6: Collateral Objects in CHA. The sixth step is Protected or Collateral Object and Human Shield Analysis. This step is normally performed through annotations on imagery; however, in cases where imagery is not available, use the best sources available. After the CDE Level 1 CHA is formed, identify and characterize the collateral objects located within the CHA. If available, review imagery to identify and characterize any collateral objects not contained in a no-strike list, paying special attention to identify all of the Category I protected or collateral objects (see Enclosure C). If unable to produce a collateral damage estimate on imagery less than 90 days old, the CDE analyst must present the additional risk to the commander. The presence of a collateral object within the CDE Level 1 CHA will drive CDE Level 2 Analysis.

(1) (U) Collateral Objects. No structure will be disregarded in collateral damage estimation, regardless of square footage, unless the structure is clearly uninhabitable (e.g., animal pens, buildings with no roof). If time permits, a trained geospatial-intelligence analyst should make the determination as to habitability and functionality of the structure in question.

## (2) (U) Human Shields

(a) (U) In cases where intelligence indicates the enemy is using involuntary or unwitting human shields, the CDE analyst will identify the presence, location, and number within the CDE Level 1 CHA. The CDE analyst will use the number of known unmitigated involuntary or unwitting human shields during CDE Level 5 casualty estimate.

(b) (U) In cases where the status of human shields is not known, the more restrictive rule applies, and the unmitigated human shields are to be protected as protected persons/collateral objects. The CDE analyst then follows the step above.

g. (U) Step seven: CBR Plume Hazard. The seventh step is CBR Plume Hazard Analysis. Once both the target and the collateral objects within the CDE Level 1 CHA are identified and characterized, evaluate the potential of producing a CBR plume hazard. The existence of this hazard is based on the characterized functionality of the target or one of the surrounding collateral

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

objects. Examples of CBR plume hazards include but are not limited to nuclear, biological, or chemical production/storage facilities; nuclear power plants; fertilizer, pharmaceutical, pesticide/herbicide production/storage facilities; medical durable equipment manufacturing/storage facilities; petroleum refineries; and paper manufacturing facilities.

(1) (U) Chemical, Biological and Radiological (CBR) Case #1. If the intended target is a CBR plume hazard, then DTRA analysis and a CDE Level 5 casualty estimate is required. Submit the target along with the weaponeering solution through the CCMD to DTRA for a Hazard Prediction Assessment Capability (HPAC) analysis. Add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate and annotate the following at the end of the CDE call: "+ HPAC Analysis." This notation ensures the final CDE call will accompany an HPAC analysis packet.

(2) (U) Chemical, Biological and Radiological (CBR) Case #2. If the intended target does not present a CBR hazard, but there is an identified CBR hazard within the CDE Level 1 CHA, continue CDE analysis to mitigate the potential weapon effects. If the **weapon's effects cannot be mitigated**, DTRA analysis and a CDE Level 5 casualty estimate are required. Submit the plume hazard along with the weaponeering solution through the CCMD to DTRA for HPAC analysis. Add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate and annotate the following at the end of the CDE call: "+ HPAC Analysis." This notation ensures the final CDE call will accompany an HPAC analysis packet.

(3) (U) Chemical, Biological and Radiological (CBR) Case #3. If **able to mitigate the weapons effects** on the CBR hazard, complete CDE analysis at the appropriate level; no HPAC analysis or casualty estimate is required for the plume hazard. However, **commanders must still be informed of the risk of errantly engaging a CBR plume hazard**; include a warning box identifying the hazard on the final output graphic to provide the CCDR with a complete picture of the risk associated with engaging the intended target. The CDE analyst may optionally submit the collateral object plume hazard for HPAC analysis at the commander's discretion, considering operational constraints. If elected, do not add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate; add the HPAC analysis and casualty estimate as a note to the final collateral damage estimate to provide the CCDR with a complete picture of the risk associated with engaging the intended target.

(4) (U) The presence of a CBR plume hazard (target or collateral concern) may elevate the target to the STAR process even if the CDE for the target is determined as low due to environmental risks or the risk of expanding the effects of the conflict (see Enclosure F, reference a).

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

h. (U) Step eight: Human/Environmental Health Hazard. The eighth and final step in CDE Level 1 initial analysis is Human/Environmental Health Hazard Analysis. The final evaluation of hazards within CDE Level 1 identifies those objects whose engagement could produce widespread, long-term, and/or severe impacts to the health of civilian or noncombatant population and/or the environment, including flooding, uncontrollable fire, and releases of toxic chemicals or radioactive materials. The presence of a human health and/or environmental hazard will drive NCMI and/or NAVO analysis and CDE Level 5 casualty analysis.

(1) (U) Environmental Case #1. (U) If the intended target is a human health and/or environmental hazard, then NCMI and/or NAVO analysis and a CDE Level 5 casualty estimate is required. Submit the target along with the weaponeering solution through the CCMD to NCMI for environmental hazard analysis, or to the NAVO for assessment (if appropriate). Include the NCMI analysis or NAVO assessment data in the final CDE, and add any estimated casualties to the overall CDE Level 5 casualty estimate. In addition, annotate at the end of the CDE call: "+ NAVO Analysis" or "+ NCMI Analysis" as required. This notation ensures the final CDE call will accompany an analysis packet.

(2) (U) Environmental Case #2. If the intended target does not present any human health and/or environmental concerns, but there is an identified human health and/or environmental hazard within the CDE Level 1 CHA, continue with CDE analysis to mitigate the potential weapon's effects on the environmental hazard. If the **weapon's effects cannot be mitigated**, NCMI and/or NAVO analysis and a CDE Level 5 casualty estimate are required. Submit the environmental hazard along with the weaponeering solution through the CCMD to NCMI and/or NAVO for analysis. Add the NCMI and/or NAVO casualty estimate and annotate at the end of the CDE call: "+ NAVO Analysis" or "+ NCMI Analysis" as required. This notation ensures the final CDE call will accompany an analysis packet.

(3) (U) Environmental Case #3. If **able to mitigate the weapons effects** on the human health and/or environmental hazard, complete CDE analysis at the appropriate level; no NCMI or NAVO analysis or casualty estimate is required. However, **commanders must still be informed of the risk of errantly engaging a CBR plume hazard**; include a warning box identifying the hazard on the final output graphic to provide the CCDR with a complete picture of the risk associated with engaging the intended target. The CDE analyst may optionally submit the collateral object human health and/or environmental hazard to NCMI and/or NAVO analysis at the commander's discretion, considering operational constraints. If elected, do not add the NCMI

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

and/or NAVO's analysis data / casualty estimate to the overall CDE Level 5 casualty estimate; add the NCMI and/or NAVO's analysis and casualty estimate as a note to the final collateral damage estimate to provide the CCDR with a complete picture of the risk associated with engaging the intended target.

(4) (U) The presence of a human health and/or environmental hazard (target or collateral concern) may elevate the target to the STAR process even if the CDE is estimated as low due to the risks of expanding the effects of the conflict (see Enclosure F, reference a).

### 3. (U) Collateral Damage Estimation (CDE) Level 1 Evaluation.

a. (U) Positive Identification (PID)/Rules of Engagement (ROE)/Defined Target/Element Outline Evaluation. "Has PID of the target been accomplished?<sup>14</sup> Is the entity a legitimate military target in accordance with the applicable ROE?"

(1) (U) If PID is accomplished, continue with CDE Level 1 analysis.

(2) (U) If PID has not been accomplished, stop. Target must be PID'd before continuing. Ensure PID and ROE issues are resolved prior to continuing to CDE Level 2.

b. (U) Dual-Use Evaluation. "Does the target facility provide products/services of both a civilian and military nature, or is the facility manned or operated by civilians?"

(1) (U) If the answer to either of these cases is yes, the facility is dual-use and requires a CDE Level 5 casualty estimate where all of the personnel within the target facility are characterized as civilian or noncombatant casualties, unless available intelligence provides more specific characterization.

(2) (U) If the answer is no, then the target is not considered dual-use and the CDE Level 1 analysis is continued.

c. (U) Protected, Collateral Objects, and Human Shields Evaluation. "Are there any protected or collateral objects, human shields (involuntary, unwitting, or status unknown) located within the CDE Level 1 CHA?"

---

<sup>14</sup> See Enclosure A, paragraph 9.a.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(1) (U) If the answer is yes, the target is determined as CDE 1 High. Continue with CDE Level 1 analysis.

(2) (U) If no, the target is eligible for engagement with any conventional weapon in the U.S. inventory with exceptions as noted in the CDE Level 1 CER Reference Table. Continue with CDE Level 1 analysis.

d. (U) Chemical, Biological and Radiological (CBR) Plume Hazard Evaluation. “Does the target or collateral object present a CBR plume hazard?”

(1) (U) If yes, the target is determined as CDE 1 High and requires further analysis to determine if the situation under step 7 of CDE Level 1 analysis is Case 1, 2, or 3.

(2) (U) If no, continue with CDE Level 1 analysis.

e. (U) Human Health and/or Environmental Hazard Evaluation. “Would engagement of this target cause widespread, long-term, and/or severe impacts to the health of civilian or noncombatant population and/or the environment?”

(1) (U) If yes, the target is determined as CDE 1 High and requires further analysis to determine if the situation under step 8 of CDE Level 1 analysis is Case 1, 2, or 3.

(2) (U) If no, continue with CDE Level 1 analysis.

f. (U) Collateral Damage Estimation (CDE) Level 1 Final Evaluation.

(1) (U) The target is determined as CDE 1 Low if all the following conditions are met: target PID is established; the target is not characterized as a dual-use facility; the target is not a CBR plume or environmental hazard; no collateral objects and/or human shields (**involuntary, unwitting or unknown status**) are within the CDE Level 1 CHA.

(2) (U) The target is determined as CDE 1 High if PID is established, the target is a valid target in accordance with ROE, and any of the following conditions are met: the target is a dual-use facility; the target is a CBR plume or human health and/or environmental hazard; the target contains human shields (involuntary, unwitting or unknown status) within the CDE Level 1 CHA; or collateral objects exists within the CDE Level 1 CHA. Under special circumstances, the target may also be subject to review via the STAR process (see Enclosure F, reference a).

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-A-8

**UNCLASSIFIED**

Appendix A  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX B TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 2 PGM GENERAL ANALYSIS

#### 1. (U) Collateral Damage Estimation (CDE) Level 2 PGM General Analysis Overview

a. (U) CDE Level 2 begins the process of analyzing weaponeering options that mitigate the potential for collateral damage. A single distinct analytical process for the PGM weapon class is employed within Level 2. CDE Level 2 PGM General Analysis is a means to estimate risk of collateral damage while enabling maximum tactical flexibility, limiting the restrictions on target engagement to either Unitary or Cluster PGMs. This step addresses the third question of the CDM, “Can I mitigate damage to those collateral objects by striking the target with a different weapon or with a different method of engagement, **yet still accomplish the mission?**”

b. (U) CDE analysts must use the weaponeering data given to them in the target folder or by the weaponeer. If the CDE is undesirably high, analyst must discuss other options with the weaponeer. A CDE analyst who is also a trained weaponeer could perform both actions, but either way the **CDE analyst must work with weaponeering personnel to ensure collateral damage mitigation does not change the intended effects on the target.**

c. (U) PGM General Analysis evaluates target engagement with PGMs on individual aimpoints or a target/element outline while affording the greatest weaponeering options to either unitary or cluster PGMs. It estimates the risk of collateral damage by employing either a unitary or cluster PGM without having to select a specific warhead. PGM General Analysis is technically supported by the CDE Level 2A PGM CER Reference Tables.

d. (U) The CDE Level 2A CER Reference Table provides two CER values that define CHAs measured from aimpoints for air-to-surface and surface-to-surface unitary or cluster PGMs. The two CER values are based on the largest PGM CER for unitary and cluster warhead type taken from the CDE Level 3A CER Reference Table with exceptions noted in CDE Level 2A CER Reference Table.

(1) (U) The PGM Unitary values in the reference table combine the radius of collateral effects from the precision warhead with a TE90 value.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(2) (U) The PGM Cluster values in the reference table combine the radius of collateral effects from the warhead, Precision TE90, and the submunition pattern radius.

e. (U) Targets determined as CDE 2 Low present a very low probability of collateral damage, but are tactically restricted for execution to PGMs only, slightly elevating the risk to mission.

## 2. (U) Collateral Damage Estimation (CDE) Level 2 PGM General Analysis Evaluation. There are two methods to perform the analysis.

a. (U) The **Outline Method**. The Outline Method evaluates the risk of collateral damage for all aimpoints within a given installation, target facility, target area or target element simultaneously by applying the appropriate CER Reference Table value measured from the target facility, area or element outline. The CER will extend from around the entire border of the installation, facility, area or element. Using the facility or target outline graphic produced during target development, determine a CHA based on the CER for either unitary or cluster PGMs from the CDE Level 2A CER Reference Table. Apply the CHA from the facility or target outline and visually search for collateral objects located within the CHA. Target type will dictate the most appropriate weapon to employ. An example of an appropriate use of the outline method is in the target development phase of the Joint Targeting Cycle wherein the actual desired points of impact are not known (see Enclosure F, reference f).

b. (U) The **Aimpoint Method**. The Aimpoint Method estimates the risk of collateral damage with engaging each individual aimpoint. The Aimpoint Method is used when analyzing potential collateral damage, and a low CDE cannot be achieved with the Outline method. A single aimpoint can be utilized at CDE Level 1 if the target is a point target, while multiple aimpoints require a target area outline. The most restrictive aimpoint for the final CDE must be promoted. Using the aimpoint graphics produced during target development, determine a CHA based on the CER value for either unitary or cluster PGMs from the CDE Level 2A CER Reference Table. Apply the CHA around each aimpoint and visually search for collateral objects located within each CHA.

## 3. (U) Collateral Damage Estimation (CDE) Level 2 Final Evaluation

a. (U) If no collateral objects are located within the CHA, a CDE 2 Low (PGM Unitary or Cluster) estimate is made for the aimpoint or target/element (depending on the method used). Targets determined to be CDE 2 Low may be engaged with any of the PGMs contained in the CDE Level 3A PGM CER Reference Table, with exceptions as noted in the CDE Level 2A PGM CER Reference Table. Note: In unique situations with undetermined warheads a

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

target may be determined as CDE 2 low PGM (without Unitary or Cluster defined).

b. (U) If collateral objects are identified within the CHA, a CDE 2 High estimate is made for the aimpoint or target/element (depending on the method used). CDE Level 3 analysis is then required.

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-B-4

**UNCLASSIFIED**

Appendix B  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX C TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 3 WEAPONNEERING ANALYSIS

#### 1. (U) Collateral Damage Estimation (CDE) Level 3 Weaponneering Analysis Overview

a. (U) CDE Level 3 begins the process of refining weaponneering options that both create the desired effect on the target and mitigate collateral damage, thereby addressing the third question in the CDM process, "Can I mitigate damage to those collateral objects by striking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?"

b. (U) The goal of CDE Level 3 is to achieve a low collateral damage estimate while limiting the number of tactical weaponneering restrictions. Considering the weapon class and system, delivery platform, and/or PGM warhead type decisions from CDE Level 2, CDE Level 3 determines appropriate delivery systems, warhead, and fuze combinations that mitigate the risk of collateral damage while still creating the desired effect on the target. When any collateral object is outdoor and within the CDE Level 3 CHA, the CDE call will be CDE 5 and a CDE Level 5 casualty analysis is required. However, in situations where CDE Level 4 CERs are applicable (i.e. indoor collateral concerns with mitigated or exception warhead) CDE Level 4 must still be completed to assist in weapon mitigation. There are three tables that support CDE Level 3 analysis and are defined below.

(1) (U) Collateral Damage Estimation (CDE) Level 3A Precision-Guided Munition (PGM) Collateral Effects Radius (CER) Reference Table. The CDE Level 3A CER Reference Table provides two columns of individual warhead CERs, measured from an aimpoint or target/element outline, to define a CHA. The table lists warheads by type: air-to-surface unitary, air-to-surface cluster, surface-to-surface unitary, and surface-to-surface cluster. The tables are arranged from larger to smaller CER surface burst values. The air burst or height of burst (HOB) values are located just beneath the surface burst values for each warhead so that all values for a single warhead are together. The values in the CDE Level 3A CER Reference Table **Unmitigated** column represent the hazard distance from weapon fragmentation (or blast if no weapon fragmentation or debris exists) to standing, unprotected personnel; while the values in the **Mitigated** column represent the hazard distance from crater ejecta or structure debris to standing unprotected personnel dressed in summer-weight uniform on open, rolling terrain. Only warheads capable of

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

delay fuzing to achieve complete burial below grade or inside a substantial structure prior to detonation are provided CER values in the Mitigated column.

(a) (U) Collateral Damage Estimation (CDE) Level 3A Precision-Guided Munition (PGM) Unmitigated Collateral Effects Radii (CERs). The **Unmitigated** column values combine the radius of collateral weapon effects and the Precision TE90 associated with the least accurate PGM guidance system and worst-case pattern radius for cluster munitions. This approach enables the development of warhead-specific CER values without considering individual weapon guidance systems. Targets determined as CDE 3 Low (PGM with Unmitigated CER) present a very low probability of collateral damage. However, these targets are tactically restricted for execution to a specific warhead or a warhead with a smaller CER delivered in a PGM only mode, thereby slightly elevating the risk to mission.

(b) (U) Collateral Damage Estimation (CDE) Level 3A Precision-Guided Munition (PGM) Mitigated Collateral Effects Radii (CERs). The **Mitigated** column numbers in the reference table combine the radius of weapons effects and Precision TE90 associated with the worst case, or least accurate, PGM guidance system for each warhead capable of a delay fuze. Targets determined as CDE 3 Low (PGM with a Mitigated CER) present a low probability of collateral damage. However, these targets are tactically restricted for execution to a specific warhead or one with a smaller CER, delivered in a PGM-only mode, thereby elevating the risk to mission because of the requirement to use a delay fuze.

(2) (U) Collateral Damage Estimation (CDE) Level 3B Air-to-Surface Unguided Munition (ASUGM) Collateral Effects Radius (CER) Reference Table. The numbers in the CDE Level 3B CER Reference Table combine the mean Precision TE90 associated with individual delivery platforms, and the CER for each air-to-surface unguided warhead. **There is no delay fuze or bomb burial option in the CDE Level 3B CER Reference Table.** The CDE Level 3B values are measured from either an aimpoint or target/element outline for single warhead deliveries or from the edge of one or more engagement zones (EZs) for multiple warhead deliveries to form the CHA. Targets determined as CDE 3 Low ASUGM present a low probability of collateral damage, but are tactically restricted to a specific delivery platform and warhead along with specific release parameters to define the EZ. As a result the risk to mission increases. Because delivery heading is a significant consideration for EZ orientation, a stated delivery heading recommendation is required with CDE 3 for multi-warhead deliveries. This recommendation further elevates the risk to mission.

Appendix C  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

(3) (U) Collateral Damage Estimation (CDE) Level 3C Surface-to-Surface Ballistic Munition (SSBM) Collateral Effects Radius (CER) Reference Table. The numbers in the CDE Level 3C CER Reference Table combine the radius of collateral weapon effects and either the TE90 for the Observer Adjusted (OA) or Predicted methods of engagement based on either less than the 1/2 maximum range to target or greater than or equal to the 1/2 maximum range to target for each weapon system, shell, and fuze combination listed in the table. The table values are measured from an aimpoint when a converged sheaf is employed, or from the outer edge of the dimensions of a circular or linear sheaf to form the CHA. It is important to note that the sheaf and method of engagement are normally specified in the call for fire and are employed consistently throughout the conduct of the fire mission and the CDE analysis. Targets determined as CDE 3 Low SSBM present a low probability of collateral damage, but are tactically restricted for execution to a specific weapon system, shell, fuze, method of engagement, sheaf type, and delivery in an SSBM only mode. Therefore, the risk to mission is increased. Targets determined as CDE 3 Low for SSBMs using the OA method of engagement present an increased probability of collateral damage due to the requirement to employ marking or adjusting rounds and the significant increase in TLE90.

## 2. (U) Collateral Damage Estimation (CDE) Level 3 Weaponeering Analysis

### a. (U) Collateral Damage Estimation (CDE) Level 3 Precision-Guided Munition (PGM) Weaponeering Analysis

(1) (U) Step 1. (U) Review the CDE Level 1 target information.

(2) (U) Step 2. Measure and record the distance from each aimpoint or target/element outline to the corresponding nearest collateral object identified in CDE Level 1 (refer to Figure 2).

(3) (U) Step 3. Select the appropriate CER value from the CDE Level 3A PGM CER Reference Table corresponding to either an unmitigated or mitigated warhead for each aimpoint or target/element outline applied in Step 1 above. When both indoor and outdoor collateral objects exist within the selected CDE level 3 CER, the analyst must consider both types of collateral objects to determine the final CDE level. In situations with outdoor collateral concerns with the CDE level 3 CHA, the final CDE call will be CDE 5.

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2.

### b. (U) Collateral Damage Estimation (CDE) Level 3 Precision-Guided Munition (PGM) Weaponeering Analysis Evaluation

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(1) (U) If the CER for the selected weaponing decision is less than or equal to the distance to the nearest collateral object, the target is determined as:

(a) (U) Unmitigated Warhead: **CDE 3 Low PGM (Warhead)**

(b) (U) Mitigated Warhead: **CDE 3 Low PGM (Warhead, Delay Fuze)**

(2) (U) If the CER value for the selected weaponing decision is **greater than** the distance to the nearest collateral object, the target is determined as **CDE 3 High** and requires CDE Level 4 analysis. In such cases the following must be considered for PGMs.

(a) (U) If CDE 3 High and mitigation is employed in the CDE Level 3 estimate, and indoor collateral concerns exist, continue to CDE Level 4.

(b) (U) If CDE 3 High, with a unitary warhead with no mitigation value available, yet the weapon is approved for unmitigated level 4 analysis and indoor collateral concerns exist, continue to CDE Level 4.

(c) (U) If CDE 3 High and mitigation is not employed in the CDE Level 3 estimate because of the weaponing solution required to create the desired target effect, or the weapon is not approved for unmitigated level 4 analysis, continue directly to CDE Level 5 to estimate the number of civilian and noncombatant casualties.

## c. (U) Collateral Damage Estimation (CDE) Level 3 Air-to-Surface Unguided Munition (ASUGM) Weaponing Analysis

(1) (U) Step 1. (U) Review the CDE Level 1 target information and apply the appropriate method of target engagement, either single or multiple warhead delivery. If performing collateral damage analysis for a multiple warhead delivery, annotate and orient the EZ. Some targets may require more than one EZ to create the desired effect. If an accurate aimpoint coordinate mensuration capability or imagery is not available, 1 meter CIB®, and Level II Digital Terrain Elevation Data (DTED) are authorized to perform this step.

(2) (U) Step 2. Measure and record the distance from either the individual aimpoint(s) for single warhead delivery or the outer edge of the EZ(s) for multiple warhead delivery to the corresponding nearest collateral object identified in CDE Level 1 (refer to Figure 2).

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

(3) (U) Step 3. Select the appropriate CER value from the CDE Level 3B ASUGM CER Reference Table corresponding to the delivery platform and warhead for each aimpoint or EZ applied in Step 1 above.

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2.

## d. (U) Collateral Damage Estimation (CDE) Level 3 Air-to-Surface Unguided Munition (ASUGM) Weaponing Analysis Evaluation

(1) (U) If the CER for the selected weaponing decision **is less than or equal to** the distance to the nearest collateral object, the target is determined as:

(a) (U) Single Warhead: **CDE 3 Low (ASUGM, Delivery Platform, Warhead)**.

(b) (U) Multiple Warhead: **CDE 3 Low (ASUGM, Delivery Platform, Warhead, Heading Recommendation: degrees)**.<sup>15</sup>

(2) (U) If the CER value for the selected weaponing decision **is greater than** the distance to the nearest collateral object, the target is determined as **CDE 3 High** and requires CDE Level 4 analysis.<sup>16</sup>

(3) (U) The CDE Level 3B ASUGM CER Reference Table only provides unmitigated CERs.

(4) (U) For CDE 3 High estimates, serious consideration should be given to only engaging the target with PGMs.

## e. (U) Collateral Damage Estimation (CDE) Level 3 Surface-to-Surface Ballistic Munition (SSBM) Weaponing Analysis

(1) (U) Step 1. Review the CDE Level 1 target information and apply the appropriate sheaf specified for the fire mission. Annotate and orient the sheaf(s). Some targets may require more than one sheaf to create the desired effect.

---

<sup>15</sup> Heading restrictions for multiple ASUGMs are derived early in the weaponing process utilizing JWS and are reflected in the CDE analysis beginning at CDE level 3.

<sup>16</sup> For ASUGMs, when an outdoor collateral object exists within the CDE level 3 CHA, proceed to CDE level 5 analysis and the CDE call will be CDE 5. However, if indoor collateral concerns also exist, CDE Level 4 must be completed to assist in weapon mitigation

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(2) (U) Step 2. Measure and record the distance from either the individual aimpoint(s) for converged sheaf deliveries, or the outer edge of the sheaf(s) for circular or linear sheaf deliveries to the corresponding nearest collateral object identified in CDE Level 1 (refer to Figure 2).

(3) (U) Step 3. Select the appropriate CER value from the CDE Level 3C SSBM CER Reference Table corresponding to the weapon system, shell, fuze, method of engagement, and range to target (min to ½ or ½ to maximum) for each sheaf applied in Step 1 above.

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2. The method of engagement in the analysis is based on the method of target acquisition or location and must remain consistent throughout CDE analysis.

f. (U) Collateral Damage Estimation (CDE) Level 3 Surface-to-Surface Ballistic Munition (SSBM) Weaponing Analysis Evaluation

(1) (U) If the CER for the selected weaponing decision **is less than or equal to** the distance to the nearest collateral object, the target is determined:

(a) (U) Predicted Fire: **CDE 3 Low (SSBM, Caliber, Weapon System, Shell, Fuze, Range, P)**.

(b) (U) Observer Adjusted Fire: **CDE 3 Low (SSBM, Caliber, Weapon System, Shell, Fuze, Range, OA)**.

(2) (U) If the CER value from the table for the selected weaponing decision is greater than the distance to the nearest collateral object, the target is determined as **CDE 3 High** and requires CDE Level 4 analysis.<sup>17</sup>

(3) (U) For the CDE 3 High estimates, serious consideration should be given to only engaging the target with PGMs.

---

<sup>17</sup> CDE level 4 analysis for SSBMs is authorized. **SSBMs listed in the CDE 4C CER Reference Table are exempted from burial criteria but commanders are strongly cautioned that SSBM use is HIGHLY discouraged at CDE Level 4 and above.** When a collateral object is outdoor and within the level 3 CHA, the CDE call will be CDE 5 and a CDE Level 5 casualty analysis will be required. However, if indoor collateral concerns also exist, CDE Level 4 must be completed to assist in weapon mitigation.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX D TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 4 REFINED ANALYSIS

#### 1. (U) Collateral Damage Estimation (CDE) Level 4 Refined Analysis Overview

a. (U) CDE Level 4 completes the process of defining weaponeering solutions that create the desired effect on the target and mitigate the potential for collateral damage. This refines the answer to question three of the CDM, "Can I mitigate damage to those collateral objects by engaging the target with a different weapon or with a different method of employment, yet still accomplish the mission?"

b. (U) CDE Level 4 is calculated for less than 1 percent probability of fractional structural damage from blast based on the assumption that civilian and noncombatant personnel will be located in noncombatant collateral structures that afford some measure of protection from fragmentation, and not exposed outside. **The degree of protection from fragmentation is variable, and dependent on wall materials, wall thickness and openings (such as windows).** The assumption is supported by the realization that the location and number of transient noncombatant or civilian personnel cannot be accurately predicted in either space or time, therefore, limiting the ability to mitigate collateral effects to only those objects that can be seen, sensed, or known with collection assets. This assumption does not negate the responsibility to account for civilians or noncombatants in the open (e.g., in rush-hour traffic, at a soccer game, or in a parade) whose presence can be predicted based on available intelligence during CDE Level 5 analysis.

c. (U) CDE Level 4 requires PGM and ASUGM munitions to be fuzed to detonate either in a target structure or, at a minimum, 100 percent below grade for nonstructural targets to further mitigate fragmentation effects on unprotected noncombatant personnel.<sup>18</sup> Unprotected personnel located in geospatially defined outdoor collateral objects must be accounted for in CDE Level 5 using the CDE Level 3 CER and resultant CHA. The goal of CDE Level 4 is to achieve a low collateral damage estimate while minimizing tactical restrictions.

d. (U) CDE Level 4 has three supporting CER Reference Tables, and their specific attributes are provided below with two noted exceptions: (1) **Cluster/ICM Restrictions**, the CDM does not support use of cluster munitions

---

<sup>18</sup> Exceptions are noted in the CER Reference Tables.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

or warheads within CDE Level 4; (2) **SSBM RAP and Extended/Enhanced Range Munitions Restrictions**, RAP and enhanced range munitions are not addressed within CDE Level 4 due to the greatly increased delivery errors associated with these weapons. Hence, values for RAP and enhanced range munitions are not provided within the CDE Level 4 SSBM CER Reference Table.

(1) (U) Collateral Damage Estimation (CDE) Level 4A Precision-Guided Munition (PGM) Collateral Effects Radius (CER) Reference Table. The CDE Level 4A CER Reference Table provides individual PGM unitary warhead CER values for individual structure types, measured from an aimpoint or target/element outline. The numbers in the table combine the radius of collateral weapon effects and the TE90 associated with the worst case, or least accurate, PGM guidance system for each warhead. This approach enables the development of warhead-specific CER values without considering individual weapon guidance systems. Considering situations that limit or preclude characterizing a structure type, the CDE Level 4A CER Reference Table provides average values for each warhead versus an "unknown" collateral structure type and grades the listed structures on resistance to blast.

(a) (U) Targets determined as CDE 4 Low PGM present a slightly elevated risk of collateral damage, but are tactically restricted for execution to a specific warhead (or one with a smaller CER), delivered with a delay fuze setting.<sup>19</sup> A delivery heading recommendation is optional.

(b) (U) **Use of the CDE Level 4A PGM CER Reference Table requires either complete warhead burial in the ground or complete internal detonation within a substantial target structure to mitigate the fragmentation effects of the warhead.**<sup>20</sup>

(c) (U) Accurate Characterization of Nearby Collateral Structures. This task can be difficult, as it is time consuming and intelligence intensive. CDE Level 4A CER Reference Table values include assumptions designed to account for this and to lower the risk of collateral damage due to mischaracterizing structure types.

(2) (U) Collateral Damage Estimation (CDE) Level 4B Air-to-Surface Unguided Munition (ASUGM) Collateral Effects Radius (CER) Reference Table. The numbers in the CDE Level 4B CER Reference Table combine the mean TE90 associated with each delivery platform and the radius of collateral effects associated with each individual air-to-surface unguided warhead. These table

<sup>19</sup> Exceptions are noted in the CER Reference Tables.

<sup>20</sup> For warheads not capable of achieving complete burial, and fragmentation effects deemed negligible, exceptions may be awarded and noted in the CER Reference Tables.

Appendix D  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

values are measured from an aimpoint or target outline for a single warhead or the edge of one or more EZs for multiple warhead deliveries to form the CHA. In addition, with the understanding that delivery heading is a significant consideration for EZ orientation, and that ASUGMS will predominantly miss in range vice deflection, **a stated delivery heading recommendation is required for multiple ASUGM deliveries (beginning at CDE level 3) and optional for single ASUGM deliveries.** Targets determined as CDE 4 Low ASUGM present an elevated risk of collateral damage. These targets are tactically restricted to a specific delivery platform and warhead with a delay fuze setting to achieve a complete detonation below grade and a specific delivery heading. These constraints further elevate the risk to the mission.

(3) (U) Collateral Damage Estimation (CDE) Level 4C Surface-to-Surface Ballistic Munition (SSBM) Collateral Effects Radius (CER) Reference Table. The CDE Level 4C CER Reference Table values combine the radius of collateral weapon effects and either the TE90 for the OA or Predicted methods of engagement based on range to target for each weapon system, shell, and fuze combination listed in the table. These values are used to form a CHA measured either from an aimpoint when a converged sheaf is used, or from the outer edge of the dimensions of a circular or linear sheaf. For the CDM, a circular sheaf is the default. It is important to note that the sheaf and method of engagement are normally specified in the call for fire and are employed consistently throughout the conduct of the fire mission and the CDE analysis. Targets determined as CDE 4 Low SSBM present an elevated risk of collateral damage and are tactically restricted for execution to a specific weapon system, shell, fuze, method of engagement, and sheaf type, thereby elevating the risk to mission. Given that SSBMs will predominantly miss in range vice deflection, a stated GTL recommendation is optional within CDE Level 4 for SSBMs. Additionally, targets analyzed for SSBMs as CDE 4 Low when the OA method of engagement is employed present an increased probability of collateral damage due to the requirement to employ marking or adjusting rounds and the significant increase in TLE associated with OA missions.

## 2. (U) Collateral Damage Estimation (CDE) Level 4 Refined Analysis

### a. (U) Collateral Damage Estimation (CDE) Level 4 Precision-Guided Munition (PGM) Refined Analysis

- (1) (U) Step 1. Review the CDE Level 1 Target Information.
- (2) (U) Step 2. Measure and record the distance between each aimpoint or target/element outline and the collateral object(s) in the vicinity. Characterize and record the structure type for the collateral objects as defined in the CDE Level 4A PGM CER Reference Table. If unable to determine the

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

structure type, record it as “unknown”<sup>21</sup>

(3) (U) Step 3. Decide if the nearest or weakest collateral structure will be used or if each collateral structure will be analyzed separately. Based on this decision and using the weaponeering decisions from Step 1, choose the appropriate value(s) from the CDE Level 4 PGM CER Reference Table.

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2.

b. (U) Collateral Damage Estimation (CDE) Level 4 Precision-Guided Munition (PGM) Refined Analysis Evaluation

(1) (U) If the CER value for the selected weaponeering decision is **less than or equal to** the distance to the nearest collateral object, the target is determined as **CDE 4 Low (PGM, Warhead, Delay Fuze (a heading recommendation is optional for PGMs))**.<sup>22</sup>

(2) (U) If the CER value for the selected weaponeering decision is **greater than** the distance to the nearest collateral concern, the target is determined as **CDE 4 High** and referred to CDE Level 5.

c. (U) Collateral Damage Estimation (CDE) Level 4 Air-to-Surface Unguided Munition (ASUGM) Refined Analysis. **Commanders are strongly cautioned that ASUGM use is highly discouraged at CDE Level 4.** Use of ASUGMs should only be attempted when PGMs are not available.

(1) (U) Step 1. Review the CDE Level 1 Target Information.

(2) (U) Step 2. Measure and record the distance from either the individual aimpoint(s) for single warhead deliveries, or the outer edge of the EZ(s) for multiple warhead deliveries to the corresponding nearest collateral object identified in CDE Level 1 (refer to Figure 2).

(3) (U) Step 3. Select the appropriate CER value from the CDE Level 4B ASUGM CER Reference Table corresponding to the delivery platform and warhead for each aimpoint or EZ applied in Step 1 above.<sup>23</sup>

---

<sup>21</sup> Very hard and very soft building types reside on the list. Every effort should be made to identify the most reasonable match before choosing “unknown.”

<sup>22</sup> A heading recommendation is optional for PGMs.

<sup>23</sup> When performing CDE level 4 analysis, outdoor collateral objects must be accounted for in CDE Level 5 using the CDE Level 3 CER and resultant CHA. In these instances the call is CDE 5.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2.

d. (U) Collateral Damage Estimation (CDE) Level 4 Air-to-Surface Unguided Munition (ASUGM) Refined Analysis Evaluation

(1) (U) If the CER value for the selected weaponing decision is **less than or equal to** the distance to the nearest collateral object, the target is determined as **CDE 4 Low ASUGM** (*restricted to the weaponing solution(s) developed in CDE 3 above, either single warhead: **Delivery Platform, Warhead, Delay Fuze, Heading Recommendation: degrees - degrees** or multiple warhead: **Delivery Platform, Warhead, Delay Fuze, Heading Recommendation: degrees***).

(2) (U) If the CER value for the selected weaponing decision is greater than the distance to the nearest collateral concern, the target is determined as **CDE 4 High** and referred to CDE Level 5.

e. (U) Collateral Damage Estimation (CDE) Level 4 Surface-to-Surface Ballistic Munition (SSBM) Refined Analysis. **Commanders are strongly cautioned that SSBM use is highly discouraged at CDE Level 4.** Use of SSBMs should only be attempted when PGMs are not available.

(1) (U) Step 1. Review the CDE Level 1 Target Information.

(2) (U) Step 2. Measure and record the distance from either the individual aimpoint(s) for converged sheaf deliveries or the outer edge of the sheaf(s) for circular or linear sheaf deliveries to the corresponding nearest collateral object identified in CDE Level 1 (refer to Figure 2).

(3) (U) Step 3. Select the appropriate CER value from the CDE Level 4C SSBM CER Reference Table corresponding to the weapon system, shell, fuze, method of engagement, and range to target (min to ½ or ½ to maximum) for each sheaf applied in Step 1 above.<sup>24</sup>

(4) (U) Step 4. Compare the CER to the distance to the nearest collateral object derived in Step 2.

f. (U) Collateral Damage Estimation (CDE) Level 4 Surface-to-Surface Ballistic Munition (SSBM) Refined Analysis Evaluation

---

<sup>24</sup> When performing CDE level 4 analysis, outdoor collateral objects must be accounted for in CDE Level 5 using the CDE Level 3 CER and resultant CHA. In these instances the call is CDE 5.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(1) (U) If the CER value for the selected weaponeering decision is **less than or equal to** the distance to the nearest collateral object, the target is determined as **CDE 4 low SSBM** (*restricted to the weaponeering solution(s) developed in CDE 3 above, **Caliber, Weapon System, Shell, Fuze, Range, OA** (or **"P" Predicted**)*). If providing an optional GTL recommendation, the target is determined as **CDE 4 low SSBM** (*restricted to the weaponeering solution(s) developed in CDE 3 above, **Caliber, Weapon System, Shell, Fuze, Range, OA** (or **"P" Predicted**), **Recommended GTL: mils - mils (or degrees - degrees)***)

(2) (U) If the CER value for the selected weaponeering decision is greater than the distance to the nearest collateral concern, the target is determined as **CDE 4 High** and referred to CDE Level 5.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX E TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 5 CASUALTY ANALYSIS

1. (U) Collateral Damage Estimation (CDE) Level 5 Casualty Analysis Overview. CDE Level 5, with a corresponding casualty estimate, is necessary when Levels 1 through 4 are insufficient for making a CDE low call. CDE Level 5 is also required when Level 1 analysis determines the presence of involuntary, unwitting, or status unknown human shields at the target, the target is a dual-use target, the target is a CBR hazard (target or collateral concern that cannot be mitigated), or an environmental hazard (target or collateral concern that cannot be mitigated). There are other unique situations that may elevate an attack to CDE Level 5 noted previously in Enclosure D. Once a target is analyzed under CDE Level 5 analysis, it remains classified Level 5 due to the level of risk and sensitive nature these factors represent for the CCMD and the national government.

2. (U) Collateral Damage Estimation (CDE) Level 5 Casualty Estimate

a. (U) The CDE Level 5 casualty estimate answers the fourth and fifth questions of CDM, "How many civilian and noncombatant casualties do we think the attack will cause?" and "Do I need to elevate this decision to the next level of command to attack the target based on the ROE currently in effect?" **Commanders must be aware they are assuming significant risk of collateral damage when engaging a target analyzed under CDE Level 5.**

(1) (U) Similar to the rest of the CDM, the casualty analysis is not an exact science. No precise means exists to predict noncombatant demographics. Population density estimates are limited to the knowledge of the unique characteristics and cultural behaviors of the region and country being assessed. As a reminder, the CDM does not take into account transient civilian or noncombatant personnel or equipment (unless precise data are known). **Therefore, it is critical that CDE Level 5 estimates never be portrayed as a precise "casualty count."**

(2) (U) The LOW requires combatants to refrain from intentionally targeting civilian or noncombatant populations or facilities. The anticipated injury or loss of civilian or noncombatant life and damage to civilian or noncombatant property, or any combination thereof, incidental to attacks must not be excessive in relation to the concrete and direct military advantage expected to be gained. Failure to observe these obligations could result in disproportionate negative effects on civilians and noncombatants and be

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

considered a LOW violation.

(3) (U) The supporting data, tables, and procedures for CE assist in estimating civilian or noncombatant casualties, and provide a standard method for computing casualty estimates. The commander then uses the CE to determine, under the ROE, if effects can be applied to the target and who may approve the application of effects on the target. The primary decision aid is the NCV and is found in the applicable ROE. Other metrics, such as specific guidance from higher headquarters, may apply more restrictive measures altering the CDM and producing a high collateral damage estimate. **CDE Level 5 constitutes the only level within the methodology where a final collateral damage estimate of “high” may be rendered. If a high estimate is rendered, the STAR process is then followed (see Enclosure F, reference a) unless approval authority has been delegated by appropriate orders/instructions.**

(4) (U) Collateral Damage Estimation (CDE) Level 5 Population Density Reference Table. The CDE Level 5 Population Density Reference Table provides a standardized format to assist in the development of data specific to a region or country.

(a) (U) Demographic data contained in the CDE Level 5 Population Density Reference Table (Appendix H to Enclosure E) is stated as population per 1000 square feet for each of the listed collateral concern functionalities.

(b) (U) Population densities reflect socialized cultural norms for functional activities and are based on standard maximum population densities for the events described within the table. CCMDs may use their discretion, experience, and current intelligence (e.g., pattern of life data) to determine what the cultural norms are for day, evening, and night periods (see footnote).<sup>25</sup> If a responsible assessment for daytime and nighttime cannot be made, the period of time between Begin Morning Nautical Twilight (BMNT) and End Evening Nautical Twilight (EENT) for daytime and the period of time between EENT and BMNT for nighttime is the default. In cases where current ground commander's assessment provides a more refined estimate of population density in a specific collateral concern, employ that data in the casualty estimate. The refined casualty estimate is only valid as long as PID and pattern of life data are maintained.

b. (U) Collateral Damage Estimation (CDE) Level 5 Casualty Estimation (CE) Worksheet and Computations. The CDE 5 CE Worksheet provides the

---

<sup>25</sup> If used, pattern of life data will be annotated on the CDE-G and corresponding CDE Remark in the MIDB.

Appendix E  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

standardized means to develop casualty estimates ensuring the CDM's intent of a simple, and repeatable process. The worksheet assists the analyst in computing a casualty estimate for those indoor and outdoor collateral concerns affected by a CDE Level 3 or 4 CER. The dominant hazard to civilians or noncombatants located within an outdoor collateral concern is fragmentation, secondary debris, or crater ejecta. The dominant hazard to civilians or noncombatants located within an indoor structure is blast causing damage to the structure and injuring the personnel inside from blunt force trauma. The total casualty estimate for the target is calculated using the following steps:<sup>26</sup>

(1) (U) Identify all collateral concerns affected by the appropriate CER. **Collateral objects determined to be shielded from the weapon effects are not considered for CE.**

(2) (U) Enter the functionality type and ID # for each collateral concern or targeted dual-use facility. **If the target is a dual-use facility, it shall always go on the first line of the worksheet.**

(3) (U) Enter the length, width and # of floors for each collateral concern and compute the total square footage (length x width x # of floors).

(4) (U) Estimate fraction affected for each collateral concern within the appropriate CER by estimating the percentage affected rounded to a 5% increment (e.g. 25%) and convert using the decimal system (e.g. 0.25). The fraction affected for a dual-use facility is determined by the portion of the facility within the Level 3 unmitigated CER. Note: For dual-use facilities, the Level 3 unmitigated CER is used to assess the percentage affected because inhabitants within the structure are not assumed to be shielded from fragmentation. See Figure 3.

---

<sup>26</sup> For PGM warheads incapable of achieving 100% burial yet given exception for inclusion to CDE level 4, determine the fraction affected for indoor CCs by the portion of the CC within the level 4 CER. The level 4 CER is applied against the indoor CC because no level 3 mitigated CERs are provided for these warheads and the fragmentation pattern associated with the warheads is deemed negligible.

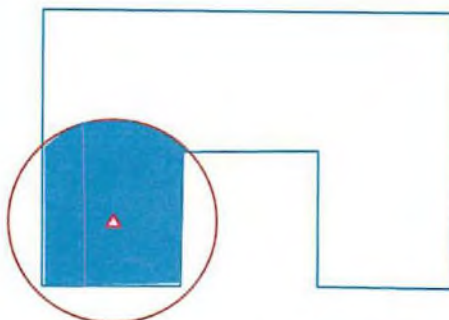


Figure 3. (U) Dual-Use Percentage Affected Example

(5) (U) Compute affected area square footage by multiplying the total square footage by the fraction affected multiplier (i.e. 1500 total area x .25 affected area = 375 affected square feet).

(6) Enter the population density for day, night, and episodic from the AOR's CDE Level 5 Population Density Reference Table based on the collateral concern functionality.

(7) Enter the appropriate casualty factor for each collateral concern. **There are only two casualty factors, either 1.0 or 0.25.** Assigning the correct casualty factor is based on the type of collateral concern, the weapon type used, and the fuzing employed. Assign the casualty factor as follows:

(a) (U) **Dual-Use.** The casualty factor for dual-use facilities is 1.0 for the portion of the facility located within the 3 unmitigated CER. Due to the sensitive nature of dual-use facilities, intelligence analysis is normally performed to estimate the facility's population density. If intelligence analysis was performed and the population is known for the portion of the facility within the 3 unmitigated CER, use that number. Otherwise, use the population density for the facility based on functionality. Collateral concerns surrounding the dual-use facility are evaluated based on the applicable 3 or 4 CER.

(b) (U) **PGM.** Table 9 and the following information apply to CE for PGM. Table 9 provides a quick reference for determining CF.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

CASUALTY FACTOR FOR PGM				
Warhead	Affected CC	CER Applied	CASUALTY FACTOR	
			Inner annulus	Outer annulus
Unmitigated (Surface or Airburst)	Outdoor	CDE 3 (unmitigated)	1.0	
	Indoor	CDE 3 (mitigated)	1.0	0.25
Mitigated (100% below grade or internal detonation) <sup>27</sup>	Outdoor	CDE 3 (mitigated)	1.0	
	Indoor	CDE 4	1.0	.25

Table 9. Casualty Factor for PGM

**1. (U) PGM Casualty Factor = 1.0 for:**

**a.** (U) Outdoor collateral concern with any portion located within the CDE Level 3 (mitigated) CHA when Level 4 analysis is performed.

**b.** (U) Outdoor collateral concern with any portion located within the CDE Level 3 (unmitigated) CHA when Level 3 analysis is performed as the final step due to inability to delay fuze the weapon.

**c.** (U) Indoor collateral concern with any portion located within the inner annulus of the Level 3 (mitigated) CER when delay fuze is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

**d.** (U) Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER when the weapon is delay fuze (or an exception warhead) to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

**2. (U) PGM Casualty Factor = 0.25 for:**

**a.** (U) Indoor collateral concern affected only by the outer annulus of the Level 3 (mitigated) CER when delay fuze is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

**b.** (U) Indoor collateral concern affected only by the outer annulus Level 4 CER when the weapon is delay fuze (or exception warhead) to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

<sup>27</sup> For warheads given an exception because they are not capable of achieving 100% burial, apply the CDE level 4 CER to determine the casualty factor.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(c) (U) **ASUGM**. The following information applies to CE for ASUGM. Table 10 provides a quick reference for determining the CF.

CASUALTY FACTOR FOR ASUGM				
Warhead	Affected CC	CER Applied	CASUALTY FACTOR	
			Inner annulus	Outer annulus
Unmitigated (Surface or Airburst)	Outdoor	CDE 3	1.0	
	Indoor	CDE 3	1.0	0.25
Mitigated (100% below grade or internal detonation)	Outdoor	CDE 3	1.0	
	Indoor	CDE 4	1.0	0.25

Table 10. Casualty Factor for ASUGM

1. (U) **ASUGM Casualty Factor = 1.0 for:**

a. (U) Outdoor collateral concern with any portion located within the Level 3 CER.

b. (U) Indoor collateral concern with any portion located within the inner annulus of the Level 3 CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

c. (U) Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER when the weapon is delay fuzed to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

2. (U) **ASUGM Casualty Factor = 0.25 for:**

a. (U) Indoor collateral concern affected only by the outer annulus of the Level 3 CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

b. (U) Indoor collateral concern affected only by the outer annulus Level 4 CER when the weapon is delay fuzed to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

(d) (U) **SSBM**. The following information applies to CE for SSBM. Table 11 provides a quick reference for determining the CF.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

CASUALTY FACTOR FOR SSBM				
Warhead	Affected CC	CER Applied	CASUALTY FACTOR	
			Inner annulus	Outer annulus
Unmitigated (Surface or Airburst)	Outdoor	CDE 3	1.0	
	Indoor	CDE 4	1.0	0.25

Table 11. Casualty Factor for SSBM

1. (U) **SSBM Casualty Factor = 1.0 for:**

a. (U) Outdoor collateral concern with any portion located within the Level 3 CER.

b. (U) Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER.

2. (U) **SSBM Casualty Factor = 0.25 for:** Indoor collateral concern affected only by the outer annulus of the Level 4 CER.

(8) Calculate a casualty estimate for each affected collateral concern for day, night and episodic as follows:

$$\text{Casualty estimate (CE)} = (\text{affected square footage}/1000) \times (\text{population density}) \times (\text{casualty factor})$$

(9) Sum the individual collateral concern casualty estimates for each of the periodic conditions (day, night, and episodic) to determine the subtotal casualty estimate. Add unmitigated involuntary, unwitting, or status unknown human shields, and/or casualty estimates from DTRA, NCMI, or NAVO as applicable (per Appendix A to Enclosure E). Round up to the next whole number. This total is now the total casualty estimate for the target.

3. (U) Collateral Damage Estimation (CDE) Level 5 Final Evaluation

a. (U) A CDE low call can be made if restrictions to the delivery (day/night/episodic) can be used to achieve a casualty estimate below the NCV. Specifically, if any of the Day/Night/Episodic CEs is less than or equal to the established NCV, the target is determined as CDE 5 Low and restricted to the weaponeering solution(s) analyzed in prior steps. In these situations, the following restriction statements are added to the end of the CDE call, restricting the attack timing: CE = (xx) Day or (xx) Night (where "xx" indicates the number of estimated casualties, annotating restriction if applicable).

(1) (U) When the NCV is exceeded by the night CE: "Day attack only"

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

(2) (U) When the NCV is exceeded by the day CE: "Night attack only"

(3) (U) When the NCV is exceeded by the episodic CE: "No attack during episodic event in \_\_\_\_\_"

(4) (U) When the NCV is exceeded by both the night CE and the episodic CE: "Day attack only and not during episodic event in \_\_\_\_\_"

(5) (U) When the NCV is exceeded by both the day CE and episodic CE: "Night attack only and not during episodic event in \_\_\_\_\_"

(6) When the NCV is exceeded by both the day CE and the night CE and intelligence exists for episodic estimation at or below the NCV: "Attack only when episodic event in \_\_\_\_\_"

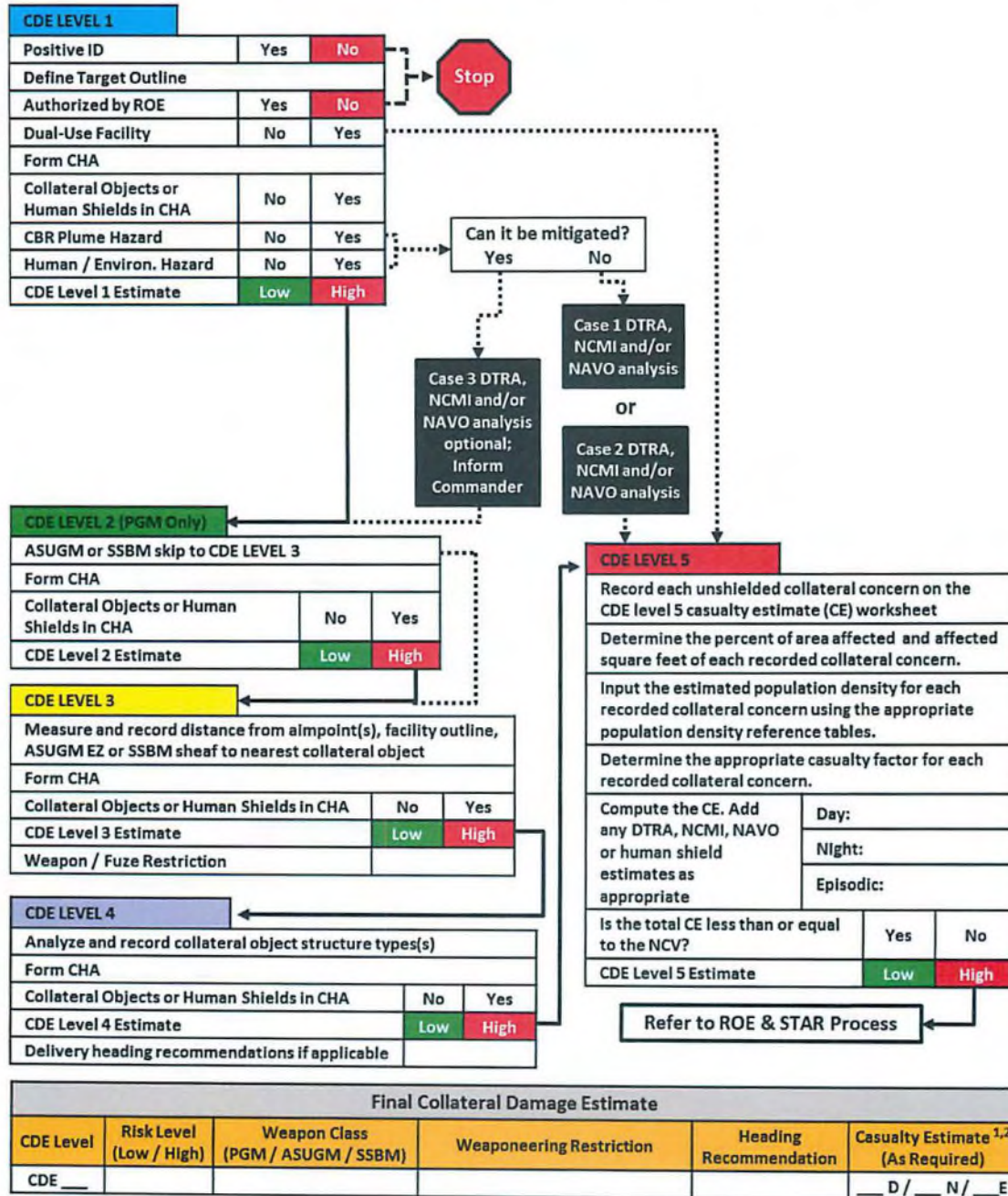
b. (U) If all the CEs are greater than the NCV, the target is determined as CDE 5 High and restricted to the weaponizing solution(s) analyzed in prior steps: CE = (xx)Day, (xx)Night, (xx) Episodic (where "xx" indicates the number of estimated casualties). Authorizations to engage targets determined as CDE 5 High require SecDef or POTUS approval (see Enclosure F, reference a) unless approval authority has been delegated by appropriate orders/instructions.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX F TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION METHODOLOGY (CDM) QUICK GUIDE



<sup>1</sup> Restriction statements, e.g., "Day attack only," would follow casualty estimate numbers

<sup>2</sup> Additional analysis requirements, e.g., "+ HPAC Analysis" would follow restriction statements

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-F-2

**UNCLASSIFIED**

Appendix F  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX G TO ENCLOSURE E

### COLLATERAL EFFECTS RADIUS (CER) REFERENCE TABLE SUMMARY

CDE Level	Intended Use	Dominant Hazard	CER/CHA Criteria and Weapon Restrictions
I	Initial analysis for all conventional weapons	Fragmentation versus personnel	Less than 10% probability of serious wound to standing, unprotected personnel, dressed in summer-weight uniform on open rolling terrain
2A	General analysis for unitary and cluster PGMs		
3A	Analysis for each PGM warhead in an unmitigated case	Fragmentation versus personnel (or blast if no weapon fragments /debris exist)	Less than 10% probability of serious wound to standing, unprotected personnel, dressed in summer-weight uniform on open rolling terrain Fuze for surface detonation or VT/airburst
	Analysis for each PGM warhead in a mitigated case	Crater ejecta/debris versus personnel	Less than 10% probability of serious wound to standing, unprotected personnel, dressed in summer-weight uniform on open rolling terrain Delay fuze for complete detonation below grade or complete detonation within target structure
3B	Analysis for each ASUGM based on delivery platform and warhead in an unmitigated case	Fragmentation versus personnel (or blast if no weapon fragments/debris exist)	Less than 10% probability of serious wound to standing unprotected personnel, dressed in summer-weight uniform on open rolling terrain Fuze for surface detonation or airburst Heading recommendation for multi-warhead delivery
3C	Analysis for each SSBM weapon system/ shell/fuze for Observer Adjusted method		Less than 10% probability of serious wound to standing unprotected personnel, dressed in summer-weight uniform on open rolling terrain
	Analysis for each SSBM weapon system/shell/fuze for Predicted method	Fuze for surface detonation or VT / airburst	
4A	Refined analysis for each PGM warhead based on collateral structure type in a mitigated case	Blast versus structures leading to blunt trauma injury to personnel	Less than 1% probability of fractional structural damage from blast Delay fuze for complete detonation below grade or complete detonation within target structure
4B	Refined analysis for ASUGM warhead and associated delivery platform based on nearest collateral structure in a mitigated case		Excludes cluster munitions Delivery heading recommendation for multi-warhead ASUGMs (optional for PGMs and single ASUGMs)
4C	Refined analysis for each SSBM weapon system/shell/fuze based on nearest collateral structure using Observer Adjusted method		Less than 1% probability of fractional structural damage from blast Excludes ICM, RAP and enhanced range munitions
	Refined analysis for each SSBM weapon system/shell/fuze based on nearest collateral structure using Predicted method	GTL recommendation (optional)	

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-G-2

**UNCLASSIFIED**

Appendix G  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX H TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION (CDE) LEVEL 5 POPULATION DENSITY TABLE AND CE WORKSHEET

<i>Valid for: (AOR/Country)</i>			
<b>CDE Level 5 Population Density Reference Table</b>			
<b>Collateral Structure Functionality</b>	<b>Estimated Population Density</b>		
	<b>Day</b>	<b>Night</b>	<b>Episodic Events</b>
<b>Residential Structures</b>			
Single Family Urban or Small Town, Upper and Middle Class			
Single Family Urban or Small Town, Lower Class and Slum			
Single Family Village or Rural Scattered, Lower Class			
Multi-Family Unit (Apartment, Condominium, Dormitory)			
<b>Institutions/Public Service</b>			
Religious			
Museum			
Library			
School			
College/University			
Hospital			
<b>Public Service Outlet</b>			
Store			
Restaurant			
Hotel/Motel			
<b>Office Building/Industrial Facility</b>			
Light Manufacturing			
Heavy Manufacturing			
Chemical, Refining, Cement			
Heat Processing (e.g. foundry)			
Craftworks			
<b>Transportation Facility</b>			
Station (Air, Rail, Bus, Subway, Gas)			
Transportation Repair (Garage, Hangar)			
Warehouse			
<b>Recreation/Entertainment</b>			
Indoor (Theater, Gymnasium)			
Outdoor Intensive (Stadium, Racetrack)			
Outdoor Extensive (Park, Zoo)			
<b>Auction</b>			
Indoor			
Outdoor/Intensive (Theater, Gymnasium, Casino)			
<b>Notes:</b>			
1. The table is based on population density per 1000 square feet.			
2. Combatant commands are responsible for tables for their assigned AOR. Combatant commands may use multiple tables to account for the disparity in population density throughout different regions of various countries.			
3. Day and night refer to socialized cultural norms for daytime/nighttime functional activities. Special consideration must be given to unique cultural practices and periodic events (e.g., religious holidays) that may influence the population density during daytime/nighttime hours as well as episodic events.			

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Casualty Estimation (CE) Worksheet															
Collateral Concern <small>(dual-use is always the first entry)</small>								Estimated Population Density			Casualty Factor	Casualty Estimate			
Functionality	ID#	Length	Width	# of Floors	Total Sq Ft	Fraction Affected (.05 to 1.0)	Affected Sq Ft	Day	Night	Episodic	(0.25 or 1.0)	Day	Night	Episodic	
Additional Analysis Casualty Estimates (DTRA, NCMI, NAVO, and human shields estimate as applicable)															
<b>Total Casualty Estimate</b>															

**Notes:**

4. This worksheet is used to compute casualty estimates based on the portion of the collateral concern located within a CDE 3 or Level 4 CHA.

5. **Collateral concern information**

5.1. Identify all collateral concerns affected by the appropriate CER. Collateral objects determined to be shielded from the weapon effects are not considered for CE.

5.2. Enter the functionality type and ID # for each collateral concern or targeted dual-use facility. If the target is a dual-use facility, it shall always go on the first line of the worksheet.

5.3. Enter the length, width and # of floors for each collateral concern and compute the total square footage (length x width x # of floors).

5.4. Estimate fraction affected for each collateral concern within the appropriate CER by estimating the percentage affected rounded to a 5% increment (e.g. 35%) and convert using the decimal system (e.g. 0.35).

5.5. Compute affected area square footage by multiplying the total square footage by the fraction affected multiplier (i.e. 1500 total area x .35 affected area = 525 affected square feet)

6. **Estimated Population Density.** Enter the population density for day, night and episodic from the AOR's CDE Level 5 Population Density Reference Table based on the collateral concern functionality. For dual-use targets enter the intelligence based casualty estimate developed in CDE Level 1 (if available).

7. **Casualty Factor.** Enter the appropriate casualty factor for each collateral concern.

7.1. **Dual-Use = 1.0.** All dual-use facilities will have a casualty factor of 1.0 for any portion located within the 3 unmitigated CER.

7.2. **Exceptions.** For PGM warheads given an exception because they are not capable of achieving 100% burial, apply the CDE level 4 CER to determine the casualty factor.

7.3. **PGM Casualty Factor = 1.0 for:**

7.3.1 Outdoor collateral concern with any portion located within the CDE Level 3 (mitigated) CHA when Level 4 analysis is performed.

7.3.2 Outdoor collateral concern with any portion located within the CDE Level 3 (unmitigated) CHA when Level 3 analysis is performed as the final step due to inability to delay fuze the weapon.

7.3.3. Indoor collateral concern with any portion located within the inner annulus of the Level 3 (mitigated) CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

7.3.4. Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER when the weapon is delay fuze to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

**7.4. PGM Casualty Factor = 0.25 for:**

7.4.1. Indoor collateral concern affected only by the outer annulus of the Level 3 (mitigated) CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

7.4.2. Indoor collateral concern affected only by the outer annulus Level 4 CER when the weapon is delay fuzed to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

**7.5. ASUGM Casualty Factor = 1.0 for:**

7.3.1. Outdoor collateral concern with any portion located within the Level 3 CER.

7.3.2. Indoor collateral concern with any portion located within the inner annulus of the Level 3 CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

7.3.3. Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER when the weapon is delay fuzed to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

**7.6. ASUGM Casualty Factor = 0.25 for:**

7.4.1. Indoor collateral concern affected only by the outer annulus of the Level 3 CER when delay fuzing is not used to achieve complete burial 100% below grade or within a substantial structure prior to detonation.

7.4.2. Indoor collateral concern affected only by the outer annulus Level 4 CER when the weapon is delay fuzed to achieve complete warhead burial 100% below grade or within a substantial structure prior to detonation.

**7.7. SSBM Casualty Factor = 1.0 for:**

7.5.1. Outdoor collateral concern with any portion located within the Level 3 CER.

7.5.2. Indoor collateral concern with any portion located within the inner annulus of the Level 4 CER.

**7.8. SSBM Casualty Factor = 0.25 for:** Indoor collateral concern affected only by the outer annulus of the Level 4 CER.

**8. Casualty Estimate.**

8.1. Calculate a casualty estimate for each affected collateral concern for day, night and episodic as follows: Casualty estimate (CE) = (affected square footage/1000) x (population density) x (casualty factor).

8.2. Sum the individual collateral concern casualty estimates for each of the periodic conditions (day, night & episodic) to determine the subtotal casualty estimate. Add human shields, and/or casualty estimates from DTRA, NCMI, or NAVO as applicable (per paragraphs 3.b.(4).(b), 3.b.(5) and 3.b.(6) respectively). Round up to the next whole number. This total is now the total casualty estimate for the target.

**UNCLASSIFIED**

CJCSI 3160.01B  
11 December 2015

(INTENTIONALLY BLANK)

E-H-4

**UNCLASSIFIED**

Appendix H  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX I TO ENCLOSURE E

### JOINT COLLATERAL DAMAGE ESTIMATION (CDE) PROGRAM STANDARDS

#### 1. (U) Introduction

a. (U) Services providing forces to a JFC and/or reachback production support to the component commander will ensure personnel conducting CDE are properly trained IAW this instruction and that proficiencies are maintained for the duration of the individual's assignment. Personnel certified and tasked with conducting CDE are considered "CDE analysts."

b. (U) Graduates of an accredited DoD Joint CDE qualification program are considered "CDE Analysts." Prior to conducting operational CDE, they must complete a local work center *certification* program. At a minimum, work center certification must include verification that the individual is a graduate of an accredited CDE qualification program, is proficient on tools used in the work center to produce collateral damage estimates, and has demonstrated proficiency by making accurate CDE calls under the supervision of a certified CDE analyst. Additionally, for organizations tasked with making operational CDE calls in support of a CCMD, work center CDE certification will include theater specific targeting policies and ROE.

c. (U) If a CCMD has specific standards for CDE certification, services are required to ensure assigned or supporting CDE analysts are competent in those CCMD specific standards.

d. (U) There are two types of CDE programs, both of which exist to enable an operational CDE capability:

(1) (U) Collateral Damage Estimation (CDE) Qualification Program. CDE qualification programs consist of academic and practical instruction based on the CDE Joint Mission Task List (JMTL). Qualification programs can be thought of as CDE "schoolhouses."

(a) (U) Upon request of an organization desiring to establish a CDE program, JTS will initially qualify the instructors and accredit the CDE qualification program via an audit.

(b) (U) In order to be qualified in CDE, students must complete the academic and practical portions of a JTS accredited qualification program, and pass a comprehensive evaluation based on the JTS-maintained master

Appendix I  
Enclosure E

E-I-1

# UNCLASSIFIED

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

question file. The comprehensive evaluation will consist of two exams provided by JTS. The first exam will cover practical application of CDM while the second will cover CDM policy. To be qualified, a student must achieve with a minimum score of 80 percent on each evaluation.

(c) (U) A JTS accredited school house may develop instructional programs that add to the JTS developed courseware, but may not subtract from the JTS courseware.

(2) (U) Collateral Damage Estimation (CDE) Certification Program. CDE certification programs are required in commands tasked with making operational CDE calls. A CDE certification program takes individuals qualified in CDE and certifies them to make operational CDE calls. When JFC assigned organizations are tasked with making operational CDE calls, CDE analysts must be trained on theater-specific ROE, Special Instructions, etc.

e. (U) Operational Collateral Damage Estimation (CDE) Capability. For purposes of this instruction, "operational CDE capability" is defined as the combination of the following components and their ability to operate as a whole (to include reachback capability) to produce collateral damage estimates: a CDM, training materials, proficiency development and maintenance procedures, work environment procedures and concept of operations, access to (and an ability to exploit) current imagery, and access to supporting intelligence and certified CDE analysts.

f. (U) JTS will maintain a master list of accredited CDE qualification programs.

## 2. (U) Collateral Damage Estimation (CDE) Instructor Criteria

a. (U) Collateral Damage Estimation (CDE) Instructor. Instructors must be a graduate of CDE qualification program and identified as a CDE instructor by the appropriate CDE Schoolhouse Program manager. Additionally, instructors must complete an instructor qualification program. CDE Instructors work in an approved CDE qualification program and are authorized to teach the CDM and provide CDE qualification to students.

b. (U) Collateral Damage Estimation (CDE) Standardization Instructor. A CDE instructor identified by the appropriate CDE schoolhouse Program Manager with demonstrated expertise in the CDE process and weapons effects. This individual must complete a period of training during which the instructor assists in teaching the qualification program under the observation of a CDE standardization instructor. Upon successful completion, a CDE Standardization Instructor is authorized to qualify new instructors, as well as

Appendix I  
Enclosure E

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

students. The CDE program manager maintains the Standardization Instructor criteria and is the authority to qualify CDE Standardization Instructors. CDE program managers and standardization instructors will be identified to Joint Staff Targeting in writing. In unique situations where CDE standardization instructors for established schoolhouses do not exist or are not able to provide upgrade training, individuals will utilize the JTS CDE Standardization Instructor to establish a schoolhouse CDE Standardization Instructor. This will normally be accomplished by the CDE instructor attending JTS for CDE standardization Instructor training.

### 3. (U) Proficiency and Currency

a. (U) Commands providing direct support to Combatant Commands will provide opportunities (training or real-world) on a recurring basis for personnel assigned to a CDE billet or function in order to maintain their proficiency.

b. (U) CDE analysts and instructors who do not perform CDE for a period of twelve or more months must recertify. At a minimum, recertification follows the program as defined by the Service or Combatant Command CDE program manager.

### 4. (U) Collateral Damage Estimation (CDE) Standardization Process

a. (U) To ensure the CDM is being taught consistently, the Joint Targeting School will utilize the following methods to ensure standardization across CDE programs:

(1) (U) Annual Curriculum Review. A forum in which accredited CDE programs will compare programs, ensure standardization of CDM application, share best practices and lessons learned, and discuss potential improvements or adjustments to CDE qualification and certification programs. This review will take place once a year. Curriculum review can be conducted in person, via video teleconferencing, or virtually as needed.

(2) (U) Collateral Damage Estimation (CDE) Standardization Team. A team of individuals, formed and led by JTS responsible for conducting biennial CDE program reviews. The team shall consist of instructors from accredited CDE programs.

JTS CDE SME (Team Lead)  
Air to Surface CDE SME  
Surface to Surface CDE SME

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

b. (U) This team shall perform a standardization review and assessment of each accredited CDE qualification program. This team will remain formed for the duration of the assessment. The JTS lead will release the team upon termination of the inspection once all associated tasks are complete and will ensure duration of team assignment has minimal impact. The results of the standardization review will be captured in writing, and distributed across all CDE programs to ensure standardization and consistent application of the CDM.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## APPENDIX J TO ENCLOSURE E

### COLLATERAL DAMAGE ESTIMATION JOINT MISSION TASK LIST (CDE-JMTL)

<b>Understand the logic, composition, facts and assumptions of the Joint Collateral Damage Estimation Methodology (CDM).</b>	
Task 1.1:	Describe why the U.S. Military requires a formal CDM to support Joint Military Operations.
Task 1.2:	Describe combatant responsibilities within the framework of the Law of War (LOW).
Task 1.3:	List and describe the Legal Imperatives underlying the logic of the CDM.
Task 1.4:	Describe how the CDM assists commanders with their LOW requirement of "Distinction."
Task 1.5:	Describe how the CDM assists commanders with their LOW requirement of "Necessity."
Task 1.6:	Describe how the CDM assists commanders with their LOW requirement of "Proportionality."
Task 1.7:	Detail the actions taken to address the Legal Imperatives of Necessity, Distinction, and Proportionality within each level of the CDM.
Task 1.8:	Describe Command Responsibilities for the estimation and mitigation of Collateral Damage.
Task 1.9:	Define the importance of the three Operational Imperatives of Mission, Force Protection, and Collateral Damage within the framework of the CDM.
Task 1.10:	Describe the role of the three Operational Imperatives on the commander's analysis of proportionality within the framework of the CDM.
Task 1.11:	Explain how the Operational Imperatives of Mission, Force Protection, and Collateral Damage are addressed and affected within each level of the CDM.
Task 1.12:	Describe and explain the inter-relationship between the Legal and Operational Imperatives within the framework of the CDM.
Task 1.13:	Describe how the CDM addresses the commander's analysis of proportionality and operational risk within the Joint Operations

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	Planning Process (JOPP).
Task 1.14:	Describe the two forms of Collateral Objects and explain why Senior U.S. Government Leadership is more concerned with one over the other, and how this concern shapes the facts and assumptions surrounding weaponizing logic employed within the CDM.
Task 1.15:	Describe the types of weapon effects; the probabilities of damage/kill associated with each effect; and how the effects align with the Operational Imperatives.
Task 1.16:	Describe and discuss the facts and assumptions associated with the three types of weapon effects.
<b>Understand the legal requirements, basis, and importance of CDE to National and Senior Military Leadership.</b>	
Task 2.1:	Explain the U.S. definition of Collateral Damage and describe the significance of this definition on how the U.S. Military conducts CDE.
Task 2.2:	Explain the purpose of CDE and discuss its significance for U.S. military operations.
Task 2.3:	Define Protected Persons/Objects and identify the documents that define them for a military operation.
Task 2.4:	Describe the categories of Collateral Objects; the functions which are associated with each category and the significance of collateral categories within the CDM.
Task 2.5:	Describe the No-Strike Policy and explain the responsibilities of Combatant Commanders and the National Intelligence Community in the No-Strike List (NSL) Development process.
Task 2.6:	Describe and define the elements of an entity identifier considering the record identification system within the MIDB.
Task 2.7:	Define NSEs, Restricted Targets, Dual Use Targets and Human Shields and explain their significance in Joint Targeting and CDE.
Task 2.8:	Define the components of a Basic Encyclopedia (BE) Number and explain the significance of these components.
Task 2.9:	Define the function and construct of a Category Code (CATCODE).
Task 2.10:	Define the purpose and construct of an O-Suffix.
Task 2.11:	Describe the difference between Lawful and Unlawful Collateral Damage.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 2.12:	Explain why the National Government and Military is concerned with Collateral Damage.
Task 2.13:	Define a Time-Sensitive Target and explain the CDE requirements surrounding the engagement of TSTs.
Task 2.14:	Define Troops in Contact (TIC) and explain the CDE requirements relevant to the employment of force in a TIC situation.
Task 2.15:	Define Joint Fires and explain which commanders are authorized to determine when a CDE Analysis is required prior to Tactical target engagements.
Task 2.16:	Define command responsibilities designated within the Law of War and explain how these responsibilities are addressed within the CDM.
Task 2.17:	Define the relationship and effect of the Law of War (LOW) and Rules of Engagement (ROE) on target categorization for a given operation.
Task 2.18:	Describe the importance of No-Strike Object definition to the CDE process and its impact on military operations.
Task 2.19:	Explain the difference between NSL Objects and RTL Targets.
Task 2.20:	Explain the rules regarding No-Strike Object treatment when located on military installations.
Task 2.21:	Explain the rules and processes regarding targeting No-Strike Objects.
Task 2.22:	Define a Dual-Use facility and describe the impact of Dual-Use designation on weapon's effects mitigation and CDE.
Task 2.23:	Describe the target functions normally associated with Dual-Use Targets.
Task 2.24:	Explain how LOW protected facilities taken over by the enemy for the purpose of advancing military objectives are classified and treated within the JTC and CDM.
Task 2.25:	Explain Command Responsibilities in relation to designating a target function as Dual-Use.
Task 2.26:	Explain the importance of ROE to target planning and CDE.
Task 2.27:	Define Human Shields and explain their importance and treatment within the CDM.
Task 2.28:	Explain in which Collateral Object Category Human Shields are classified and describe the sensitivities surrounding them.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 2.29:	Explain Command Responsibilities for the identification and treatment of Human Shields.
Task 2.30:	Explain Command Responsibilities for making proportionality decisions and the factors which affect their decision making.
Task 2.31:	Describe the National Values of the U.S. and explain the effect of these values on the employment of force in military operations.
Task 2.32:	Discuss the importance of the conscientious application of force to Joint military operations (JMO) and how this impacts our implementation of CDE.
Task 2.33:	Define the factors which impact Strategic Risk in the conduct of JMO.
Task 2.34:	List and discuss the impact of excessive collateral effects on the analysis of Strategic Risk and the potential consequences of elevated Strategic Risk on the conduct of JMO.
Task 2.35:	List and discuss the factors which drive the requirement to conduct CDE for individual target engagements for 21st Century Military Operations.
Task 2.36:	Explain command responsibilities for risk management within the three operational imperatives.
Task 2.37:	Describe how the CDM supports a commander's analysis and management of risk.
Task 2.38:	Explain the relationship between increasing mitigation techniques and the operational imperatives, and how this affects the commander's analysis of risk and proportionality in the conduct of JMO.
Task 2.39:	Define when and explain the specific actions taken to address the Legal Imperatives within each CDE Level in the CDM.
Task 2.40:	Explain how the outputs of the CDM assist commanders in the decision making process and describe Strike Approval Authority (SAA) considerations when making proportionality decisions.
Task 2.41:	Define a Sensitive Target and explain the circumstances that may lead to a target being designated as Sensitive.
<b>Understand the weaponeering and mitigation logic of the CDM, including, basic weaponeering principles, weapon's effects mechanisms, mitigation techniques, and how the relationship between terminal ballistic condition (TBC) and noncombatant posture (NCP) defines the dominant weapon's effects hazards within the CDM.</b>	

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 3.1:	Describe the operational causes of Collateral Damage.
Task 3.2:	Identify and describe the factors that affect delivery accuracy.
Task 3.3:	Identify the Five Primary Collateral Damage Effects of a conventional warhead and describe how these effects are measured.
Task 3.4:	Identify the Five Elements of Accurate Predicted Fire and explain how the CER Reference Table framework addresses each of them.
Task 3.5:	Explain the CER Reference Table framework and define the Dominant Hazards within each CER Reference Table.
Task 3.6.:	Define and describe the five approved methods for mitigating collateral weapon's effects and explain why each meets the LOW Imperative of proportionality
Task 3.7:	Define PID, including the standards for the two components which inform PID (CID and FFT).
Task 3.8:	Describe the purpose and importance of the target/element outline.
Task 3.9:	Define the components of a CER for a Unitary Weapon.
Task 3.10:	Define the components of a CER for a Cluster/ICM Weapon.
Task 3.11:	Define the components of TE90.
Task 3.12:	Define TLE; describe the elements which affect TLE and explain how TLE is computed.
Task 3.13:	Explain the percentage of TLE accounted for in the CER and why this percentage is relevant in light of LOW requirements.
Task 3.14:	Define the TLE90 values employed within the CER calculations and explain to which weapon class and/or method of engagement the values are associated.
Task 3.15:	Define CEP; describe the elements which affect CEP and explain how CEP is computed.
Task 3.16:	Explain the percentage of Circular Error accounted for in the CERs and why this percentage is relevant in light of LOW requirements.
Task 3.17:	Define the CE90 values employed within the CER calculations and explain how these values are derived based on the weapon class.
Task 3.18:	Identify the forces which produce a ballistic trajectory and explain the impact of these forces on trajectory.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 3.19:	Define and describe range and deflection error and the proportional relationship between them.
Task 3.20:	Describe how TLE90 and CE90 are combined to form TE90.
Task 3.21:	Describe how the CDM addresses the requirements of the Five Elements of Accurate Predicted Fire and the facts and assumptions employed in the development of the CERs.
Task 3.22:	Define the five primary collateral damage effects of a kinetic warhead and explain the chronological order in which they occur.
Task 3.23:	Define the dominant hazard to standing exposed personnel.
Task 3.24:	Define the dominant hazard to structures and the importance of the dominant hazard within CDE.
Task 3.25:	Define the weapon effects threshold accounted for in the CERs within the CDM and the significance of this threshold in light of the requirements of the LOW.
Task 3.26:	Explain the standard weapon effects mitigations employed within each CDE Level and CER Reference Table and the logic for the order in which the mitigations are applied.
Task 3.27:	Describe and discuss the dominant components of a CER considering both the weapon class and CDE Level/Dominant Hazard.
Task 3.28:	Define and discuss the five authorized mitigation techniques, and to which weapon effect each of the mitigation techniques is applicable.
Task 3.29:	Describe why Delay Fuze is a primary mitigation technique within the CDM and explain which weapon effects are mitigated by this technique.
Task 3.30:	Describe how and when VT Fuze can be employed and which weapon effects are mitigated by this technique.
Task 3.31:	Explain why VT Fuze is a recommended mitigation technique for SSBM for targets located in an urban environment.
Task 3.32:	Describe how and when shielding can be employed and the weapon effects mitigated by this technique.
Task 3.33:	Describe why Delivery Heading is a primary mitigation technique within the CDM and explain which weapon effects are mitigated by this technique.
Task 3.34:	Explain the rules regarding the employment of a Delivery Heading recommendation considering the CDE Level, Weapon Class, and

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	nearby collateral object types.
Task 3.35:	Describe how and when Aimpoint Offset can be employed and which weapon effects are mitigated by this technique.
Task 3.36:	Explain how Aimpoint Offset can affect casualty factor for CE.
Task 3.37:	Describe the three mechanisms associated with a blast-frag warhead's lethality and discuss the importance of each for both lethality and collateral damage.
<b>Understand the facts, assumptions, processes and data requirements to accomplish a CDE Level 1: Initial Analysis.</b>	
Task 4.1:	Define PID, including the standards for the two components which inform PID (CID and FFT).
Task 4.2:	Describe the considerations for the development of a target/element outline in light of targeting principles and the CDE Legal and Operational Imperatives.
Task 4.3:	Discuss the linkage between target functionality and ROE authorization.
Task 4.4:	Identify the key elements of information required for annotation on a CDE Graphic in CDE Level 1.
Task 4.5:	Define a Dual-Use Target and explain the rules regarding them in the CDM.
Task 4.6:	Define the functionalities associated with CBR Plume targets and explain the rules associated with CBR Plume targets within the CDM.
Task 4.7:	Define the five functionalities associated with Environmental Hazard targets and explain the rules associated with Environmental Hazard targets within the CDM.
Task 4.8:	List the Agencies and identify the tools employed to conduct CE.
Task 4.9:	List the Agencies and identify the tools employed to conduct CE analysis on Environmental Hazard targets.
Task 4.10:	Discuss the steps within CDE Level 1 which are applicable to the first Basic CDE Question (Target Validation) and explain their significance to the logic of the CDM.
Task 4.11:	Discuss the steps within CDE Level 1 which are applicable to the second Basic CDE Question (Initial Analysis) and explain their significance to the logic of the CDM.
Task 4.12:	Define the Dominant Weapon Effects Hazard within the CDE 1 CER Reference Table and explain how TBC of the warhead

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	compared to the NCP dictates this Dominant Hazard.
Task 4.13:	Describe from what point the CDE 1 CER is applied to form the CDE 1 CHA.
Task 4.14:	List the warhead/weapon exceptions (i.e. those not accounted for) within the CDE 1 CHA Analysis and explain why these warheads/weapons are omitted from the CDE 1 analysis.
Task 4.15:	Define the limitations and exclusions that the CDM does not account for and explain why the CDM does not address these limitations and conclusions in light of the legal imperatives of proportionality and distinction.
Task 4.16:	Describe how many CERs are contained in the CDE 1 CER Reference Table and discuss the logic surrounding this quantity of CERs.
Task 4.17:	List the steps in CDE Level 1 which may cause termination of the CDE Analysis and explain why these steps are so critical to the conduct of a valid CDE Analysis.
Task 4.18:	List the three steps in CDE 1 which may cause "mitigation failure" and lead to the conduct of a CDE Level 5 Casualty Estimate.
Task 4.19:	Describe the sources of the munitions' technical data employed in the development of the CER Reference Tables and explain why these sources are important to the logic of the CDM.
Task 4.20:	Produce an accurate CDE Level 1 Analysis.
Task 4.21:	Identify the data elements and standards for the production of a CDE Level 1 Graphic.
Task 4.22:	Identify the data-basing requirements for the completion of a CDE Level 1 Analysis.
<b>Understand the facts, assumptions, processes and data requirements to accomplish a CDE Level 2: PGM General Analysis</b>	
Task 5.1:	Define, in order, the CDE Levels which address the third Basic CDE Question (Mitigation) and explain how the order of the built-in mitigations affects the Operational Imperatives.
Task 5.2:	Explain why CDE Level 2 is a decision point within the CDM and discuss the decision which must be made and the factors which affect this decision.
Task 5.3:	Define the Dominant Weapon Effects Hazard within the CDE 2A CER Reference Table and explain how the TBC of the warhead compared to the NCP dictates this Dominant Hazard.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 5.4:	Define the two CERs contained in the CDE 2A CER Reference Table and explain from which other table these CERs are taken.
Task 5.5:	Define the weapon/warhead exceptions for a CDE 2 Low Analysis.
Task 5.6:	Discuss the risk management logic for only allowing the PGM Weapon Class for a CDE 2 Low analysis.
Task 5.7:	Describe from what point the CDE 2A CER is applied to form a CDE Level 2 CHA.
Task 5.8:	Define and describe the key elements of information which are contained on a CDE Level 2 CDE Graphic.
Task 5.9:	Explain the process for conducting a CDE 2 PGM General Analysis.
Task 5.10:	Define a nearest collateral object and explain the importance of the nearest collateral object in CDE.
Task 5.11:	Define the math rule for the comparison of a CER to a nearest collateral object when performing CDE Level 2 PGM General Analysis.
Task 5.12:	Describe the mitigations employed within CDE Level 2 and how these mitigations affect the operational imperatives.
Task 5.13:	Describe the format of a CDE Level 2 Low Analysis.
Task 5.14:	Explain how the legal imperative of proportionality is addressed by a CDE Level 2 Low Analysis.
Task 5.15:	Identify the data elements and standards for the production of a CDE Level 2 Graphic.
Task 5.16:	Identify the data-basing requirements for the completion of a CDE Level 2 Analysis.
<b>Understand the facts, assumptions, processes and data requirements to accomplish a CDE Level 3: Weaponering Analysis.</b>	
Task 6.1:	Describe why CDE Level 3 is named the Weaponering Analysis.
Task 6.2:	Explain the significance of weaponering for desired military effects in light of the legal and operational imperatives.
Task 6.3:	Identify the CER Reference Tables which support the CDE Level 3 Analysis and define which weapon class is associated with each CER Reference Table.
Task 6.4:	Define the dominant weapons' effects hazards within the CDE 3A, 3B and 3C CER Reference Tables and explain the relationship between the warhead's TBC versus NCP associated with these

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	dominant hazards.
Task 6.5:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 3A CER Reference Table.
Task 6.6:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 3B CER Reference Table.
Task 6.7:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 3C CER Reference Table.
Task 6.8:	Define the TLE90s associated with the Observer Adjusted and Predicted Methods of Engagement for SSBM CDE Analysis.
Task 6.9:	Identify the Predicted Method of Engagement Aimpoint Standards for SSBM CDE Analysis.
Task 6.10:	Explain the math rules for conducting a CDE Level 3 Weaponneering Analysis.
Task 6.11:	Describe from where a CDE 3A CER is applied to form a CDE Level 3 PGM CHA.
Task 6.12:	Describe from where a CDE 3B CER is applied to form a CDE Level 3 ASUGM, Single Warhead Delivery CHA.
Task 6.13:	Describe from where a CDE 3B CER is applied to form a CDE Level 3 ASUGM, Multiple Warhead Delivery CHA.
Task 6.14:	Describe from where a CDE 3C CER is applied to form a CDE Level 3 SSBM CHA.
Task 6.15:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for PGM.
Task 6.16:	Define the two methods of engagement for ASUGM and describe their significance to the CDE Level 3 Weaponneering Analysis Process.
Task 6.17:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for ASUGM, Single Warhead Delivery.
Task 6.18:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for ASUGM, Multiple Warhead Delivery.
Task 6.19:	Define the two methods of engagement for SSBM and describe their significance to the CDE Level 3 Weaponneering Analysis Process.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 6.20:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for SSBM with a Circular Sheaf.
Task 6.21:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for SSBM with a Linear Sheaf.
Task 6.22:	Explain the process for performing a CDE Level 3 Weaponneering Analysis for SSBM with a Converged Sheaf.
Task 6.23:	Explain how the method of engagement, employed in a CDE Level 3 SSBM Weaponneering Analysis addresses mitigation in light of the Five Elements of Accurate Predicted Fire.
Task 6.24:	Explain the importance of delivery heading for a CDE Level 3, ASUGM, Multiple Warhead Delivery Weaponneering Analysis.
Task 6.25:	Describe the format of a CDE Level 3 PGM Weaponneering Analysis.
Task 6.26:	Describe the format of a CDE Level 3 ASUGM, Single Warhead Delivery Weaponneering Analysis.
Task 6.27:	Describe the format of a CDE Level 3 ASUGM, Multiple Warhead Delivery Weaponneering Analysis.
Task 6.28:	Describe the format of a CDE Level 3 SSBM Weaponneering Analysis.
Task 6.29:	Explain how the legal imperative of proportionality is addressed by a CDE Level 3 Low Analysis.
Task 6.30:	Identify the data elements and standards for the production of a CDE Level 3 Graphic, when the target facility is determined as CDE 3 Low.
Task 6.31:	Identify the data-basing requirements for the completion of a CDE Level 3 Analysis.
<b>Understand the facts, assumptions, processes and data requirements to accomplish a CDE Level 4: Refined Analysis.</b>	
Task 7.1:	Describe why CDE Level 4 is named the Refined Analysis.
Task 7.2:	Identify the CER Reference Tables used to support the CDE Level 4 Analysis and define which weapon class is associated with each CER Reference Table.
Task 7.3:	Define the dominant weapons' effects hazards addressed within the CDE 4A, 4B and 4C CER Reference Tables.
Task 7.4:	Identify the weaponneering restrictions/limitations imposed on PGM employment within the CDE Level 4 Refined Analysis and

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	explain the rationale for these restrictions.
Task 7.5:	Identify the weaponizing restrictions/limitations imposed on ASUGM employment within the CDE Level 4 Refined Analysis and explain the rationale for these restrictions.
Task 7.6:	Explain why ASUGM is “highly discouraged” from use against targets requiring a CDE Level 4 Refined Analysis.
Task 7.7:	Explain why VT/Proximity Fuzing is preferred for SSBM in CDE Level 4.
Task 7.8:	Identify the weaponizing restrictions/limitations imposed on SSBM employment within the CDE Level 4 Refined Analysis and explain the rationale for these restrictions.
Task 7.9:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 4A CER Reference Table.
Task 7.10:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 4B CER Reference Table.
Task 7.11:	Describe the organization of, and data elements required, to identify an appropriate CER within the CDE 4C CER Reference Table.
Task 7.12:	Explain the math rules for conducting a CDE Level 4 Refined Analysis.
Task 7.13:	Describe from where a CDE 4A CER is applied to form a CDE Level 4 PGM CHA.
Task 7.14:	Describe from where a CDE 4B CER is applied to form a CDE Level 4 ASUGM, Single Warhead Delivery CHA.
Task 7.15:	Describe from where a CDE 4B CER is applied to form a CDE Level 4 ASUGM, Multiple Warhead Delivery CHA.
Task 7.16:	Describe from where a CDE 4C CER is applied to form a CDE Level 4 SSBM CHA.
Task 7.17:	Explain the process for performing a CDE Level 4 Refined Analysis for PGM.
Task 7.18:	Explain the importance of the nearest collateral object Structure Type for the conduct of a CDE 4 PGM Refined Analysis.
Task 7.19:	Define the two methods of engagement for ASUGM and describe their significance to the CDE Level 4 Refined Analysis Process.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 7.20:	Explain the process for performing a CDE Level 4 Refined Analysis for ASUGM, Single Warhead Delivery.
Task 7.21:	Explain the process for performing a CDE Level 4 Refined Analysis for ASUGM, Multiple Warhead Delivery.
Task 7.22:	Explain the weaponizing facts for SSBM which allow the conduct of a CDE Level 4 SSBM Refined Analysis without two forms of mitigation.
Task 7.23:	Define the two methods of engagement for SSBM and describe their significance to the CDE Level 4 Refined Analysis Process.
Task 7.24:	Explain the process for performing a CDE Level 4 Refined Analysis for SSBM with a Circular Sheaf.
Task 7.25:	Explain the process for performing a CDE Level 4 Refined Analysis for SSBM with a Linear Sheaf.
Task 7.26:	Explain the process for performing a CDE Level 4 Refined Analysis for SSBM with a Converged Sheaf.
Task 7.27:	Explain how the method of engagement, employed in a CDE Level 4 SSBM Weaponizing Analysis addresses mitigation in light of the Five Elements of Accurate Predicted Fire.
Task 7.28:	Describe the Heading rules for a PGM or ASUGM, Single Warhead Delivery Analysis for a CDE Level 4 Refined Analysis on a Simple Target Facility.
Task 7.29:	Describe the Heading rules for a PGM or ASUGM, Single Warhead Delivery Analysis for a CDE Level 4 Refined Analysis on a Complex Target Facility.
Task 7.30:	Explain the importance of delivery heading for a CDE Level 4, ASUGM, Multiple Warhead Delivery Refined Analysis.
Task 7.31:	Describe the format of a CDE Level 4 PGM Refined Analysis.
Task 7.32:	Describe the format of a CDE Level 4 ASUGM, Single Warhead Delivery Refined Analysis.
Task 7.33:	Describe the format of a CDE Level 4 ASUGM, Multiple Warhead Delivery Refined Analysis.
Task 7.34:	Describe the format of a CDE Level 4 SSBM Refined Analysis.
Task 7.35:	Explain how the legal imperative of proportionality is addressed by a CDE Level 4 Low Analysis.
Task 7.36:	Identify the data elements and standards for the production of a CDE Level 4 Graphic, when the target facility is determined as

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

	CDE 4 Low.
Task 7.37:	Identify the data-basing requirements for the completion of a CDE Level 4 Refined Analysis.
<b>Understand the facts, assumptions, processes and data requirements to accomplish a CDE Level 5: Casualty Estimate/Analysis</b>	
Task 8.1:	List the Agencies and tools, and describe the process for conducting a casualty estimate on an Environmental Hazard Target.
Task 8.2:	Explain how the output of an Environmental Hazard Target is included in the Target's Casualty Estimate.
Task 8.3:	Define an Affected CC.
Task 8.4:	Given weapon class, weaponering, mitigation and NCP, determine and apply the correct CER value, and define associated dominant hazard(s).
Task 8.5:	Describe the purpose of the CDE 5 Casualty Estimation (CE) Worksheet and define the construct and data fields contained within it.
Task 8.6:	Explain the significance of an Affected CCs function for CE.
Task 8.7:	Describe the process and math rule for determining the total area (square feet) of an Affected CC.
Task 8.8:	Explain the rules and process for determining the percent affected for an Affected CC.
Task 8.9:	Describe and discuss the rules for Shielding when conducting a CE and explain how Shielding is accounted for in the CDE 5 CE Worksheet.
Task 8.10:	Describe the process and math rule for determining the affected area (square feet) of an Affected CC.
Task 8.11:	Describe the purpose of the CDE 5 Population Density Reference Table and define the construct and data fields contained within it.
Task 8.12:	Explain Combatant Command responsibilities for the development and maintenance of the CDE 5 Population Density Reference Table.
Task 8.13:	Define how "socialized cultural norms" may affect the timeframes of day and night for CE.
Task 8.14:	Define "episodic events" for CE.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 8.15:	Define the relationship between an Affected CCs function and its population density for CE.
Task 8.16:	Define a CF and explain its purpose for CE.
Task 8.17:	Determine the correct CF, given target classification ("dual use" or "not dual-use" and the type and location of collateral concerns with respect to the inner and outer annulus.
Task 8.18:	Describe the process and math rule for computing an Affected CC Casualty Estimate.
Task 8.19:	Describe the process and math rule for computing a Target Facility's Total Casualty Estimate.
Task 8.20:	Define a NCV and explain its significance and use within the CDM.
Task 8.21:	Explain the process and math rules for comparing CE versus NCV and completing a CDE 5 Casualty Estimate.
Task 8.22:	Define restriction statements and explain its significance, use and effect on a Collateral Damage Estimate.
Task 8.23:	Describe the format of a CDE Level 5, PGM Aimpoint Analysis.
Task 8.24:	Describe the format of a CDE Level 5, ASUGM, Single Warhead Delivery Aimpoint Analysis.
Task 8.25:	Describe the format of a CDE Level 5, ASUGM, Multiple Warhead Delivery Engagement Zone Analysis.
Task 8.26:	Describe the format of a CDE Level 5, SSBM Sheaf Analysis.
Task 8.27:	Describe the additional data elements included in a Target Facility CDE Analysis which are not contained within an aimpoint, EZ, or sheaf CDE Analysis.
Task 8.28:	Identify, in order, the Aimpoint, EZ or Sheaf promotion rules under the "Most Restrictive" criteria and discuss the logic for the prescribed order in relationship to the Operational Imperatives.
Task 8.29:	Identify, in order, the Aimpoint, EZ or Sheaf promotion rules under the "Most Dangerous" criteria and discuss the logic for the prescribed order in relationship to the Operational Imperatives.
Task 8.30:	Discuss the purpose of Aimpoint, EZ or Sheaf promotion for determining the Target Facility CDE Level Analysis.
Task 8.31:	Explain what, if any, changes occur to the individual Aimpoint, EZ or Sheaf CDE Analysis when the Target Facility CDE Level Analysis is CDE 2, 3 or 4 Low.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Task 8.32:	Explain what, if any, changes occur to the individual Aimpoint, EZ or Sheaf CDE Analysis when the Target Facility CDE Level Analysis is CDE 5 Low.
Task 8.33:	Explain what, if any, changes occur to the individual Aimpoint, EZ or Sheaf CDE Analysis when the Target Facility CDE Level Analysis is CDE 5 High.
Task 8.34:	Explain how the legal imperative of proportionality is addressed by a CDE Level 5 Low and a CDE Level 5 High Analysis.
Task 8.35:	Identify the data elements and standards for the production of a CDE Level 5 Graphic, when the target facility is determined as CDE 5 Low or CDE 5 High.
Task 8.36:	Identify the data-basing requirements for the completion of a CDE Level 5 Casualty Analysis.

ENCLOSURE F

REFERENCES

- a. CJCSI 3122.06 series, "Sensitive Target Approval and Review (STAR) Process"
- b. JP 3-0, 11 August 2011, "Joint Operations"
- c. "Department of Defense Law of War Manual," June 2015, General Counsel of the Department of Defense
- d. DoD Directive 2311.01E, 9 May 2006 (incorporating Change 1, dated 15 November 2010 and certified current as of 22 February 2011), "DoD Law of War Program"
- e. Defense Intelligence Report, DI-2820-2-03, 12 March 2003 (current as of 3 January 2006), "Battle Damage Analysis Reference Handbook"
- f. JP 3-60, 31 January 2013, "Joint Targeting"
- g. DIA Defense Intelligence Reference Document DDB-2600-725-89, June 1989, "Point Reference Guide Book (U)"
- h. CJCSM 3370.01, 25 October 2013, "Target Graphic Standards"

SUPPORTING DOCUMENTATION

1. CJCSI 5810.01 Series, "Implementation of the DoD Law of War Program"
2. JP 3-12, 5 February, 2013, "Cyberspace Operations (U)"
3. JP 3-13, 27 November, 2012 (incorporating Change 1, dated 20 November 2014), "Information Operations (U)"
4. DIA MIDB Category Code Handbook, July 2011
5. CJCSI 3110.01 Series, "(U) Joint Strategic Capabilities Plan (JSCP)"

**UNCLASSIFIED//~~FOR OFFICIAL USE ONLY~~**

CJCSI 3160.01B  
11 December 2015

6. JTCG/ME Publication, 61 JTCG/ME-05-4, 29 September 2008, "Collateral Damage Estimation (CDE) Table Development (U)," 29 September 2008
7. Title 10, U.S.C., section 153, "Chairman's Functions (U)"
8. DoD Directive 5100.1, 21 December 2010, "Functions of the Department of Defense and Its Major Components (U)"
9. DoD Directive 5105.21, 18 March 2008, "Defense Intelligence Agency (DIA) (U)"
10. CJCSI 3370.01A, 17 October 2014, "Target Development Standards ~~(U//FOUO)~~"
11. CJCSI 3375.01, 29 May 2014, "Target Intelligence Data Standards ~~(U//FOUO)~~"
12. JP 3-09, 14 December 2014, "Joint Fire Support (U)"

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## GLOSSARY

### PART I-ABBREVIATIONS AND ACRONYMS

*Items marked with an asterisk (\*) have definitions in PART II*

AOR	area of responsibility
ASUGM	air-to-surface unguided munition
BE	basic encyclopedia
BMNT	begin morning nautical twilight
CAT	category
CATCODE	category code
CBR	chemical, biological, and radiological
CC*	collateral concern
CCDR	Combatant Commander
CCMD	Combatant Command
CD*	collateral damage
CDA*	collateral damage assessment
CDE*	collateral damage estimation
CDE-G	collateral damage estimate-graphic
CDM*	collateral damage estimation methodology
CE*	casualty estimation
CE90	circular error (90 percent probability)
CEE*	collateral effects estimation
CEP	circular error of probability
CER*	collateral effects radius/radii)
CF*	casualty factor
CHA*	collateral hazard area
CHAMP	Chemical Hazard Area Modeling Program
CID	combat identification
CIB®	controlled image base®
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CM	Chairman's Memorandum
COLISEUM	Community On-Line Intelligence System for End Users and Managers
CSA	combat support agency
DoD	Department of Defense
DIA	Defense Intelligence Agency
DIAP	Defense Intelligence Analysis Program

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

DISA	Defense Information Systems Agency
DODD	Department of Defense Directive
DTED	Digital Terrain Elevation Data
DTG	date-time-group
DTRA	Defense Threat Reduction Agency
EC	enemy combatant
EENT	end evening nautical twilight
EID	entity identifier
ETL	Electrical transmission line
EZ	engagement zone
FFT	friendly force tracking
FO	forward observer
GAU	airborne gun unit
GCCS	Global Command and Control System
GPS	Global Positioning System
GTL	Gun Target Line
HOB	height of burst
HPAC	hazard prediction assessment capability
IAW	in accordance with
IC	intelligence community
ICM	improved conventional munitions
ID	identity; identifier
IFIS	international financial institutions
IGO	intergovernmental organization
IRC	information-related capabilities
J-2	Joint Staff, Director for Intelligence
J-23	Joint Staff Director for Intelligence, Deputy Directorate for Crisis and Current Operations
JADOCS	Joint Automated Deep Operations Coordination System
JCPS	Joint Collateral Damage Estimation Program Standards
JCS	Joint Chiefs of Staff
JEL	Joint Electronic Library
JFC	Joint Force Commander
JIACG*	Joint interagency coordination group
JMO	joint military operations
JMTL	Joint Mission Task List
JOPP	Joint Operations Planning Process
JP	Joint Publication

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

JSCP	joint strategic capabilities plan
JTAC	Joint Terminal Attack Controller; Joint Tactical Air Controller
JTC	Joint Targeting Cycle
JTCG/ME	Joint Technical Coordinating Group for Munitions Effectiveness
JTF	joint task force
JTL*	joint target list
JTT	Joint Targeting Toolbox
JTS	Joint Targeting School
LOAC	law of armed conflict
LOW	law of war
MIDB*	modernized integrated database
MSBS	Money Services Businesses
NAI*	named area of interest
NAVO	Naval Oceanographic Office
NCMI	National Center for Medical Intelligence
NCP	noncombatant posture
NCV	noncombatant and civilian casualty cutoff value
NGA	National Geospatial-Intelligence Agency
NOM-DCR	nomination-database change request
NPW	National Production Workshop
NSE*	No-Strike entity
NSL*	No-Strike list
NTM	National Technical Means
OA	observer adjusted
OPORD	operation order
ORNL	Oak Ridge National Laboratory
PGM*	precision-guided munition
PID*	positive identification
POI	Program of Instruction
POW	prisoner of war
RAC*	responsible analytic center
RAP	rocket assisted projectile
RESPROD	responsible producer
RIVENTSUM	Riverine Environmental Intelligence Summary
RTL*	restricted target list
ROE*	rules of engagement

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

SAA	Strike Approval Authority
SecDef	Secretary of Defense
SIPRNET	Secret Internet Protocol Router Network
SME	subject matter expert
SSBM	surface-to-surface ballistic munition
STAR	sensitive target approval and review
TBC	terminal ballistic condition
TE90	total error 90
TIC	troops in contact
TLE*	target location error
TLE90	target location error (90 percentile)
TST	time-sensitive target
U	UNCLASSIFIED
US	United States
USC	United States Code
VT	variable time (fuze)
VTC	video teleconferencing

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

## PART II-DEFINITIONS

**NOTE: Unless otherwise stated, the terms and definitions contained in this glossary are for the purposes of this instruction only.**

additional damage. Unintentional or incidental injury or damage to combatant persons or objects that would be lawful military targets in the circumstances ruling at the time.

ballistic munition. A munition that does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated.

ballistic trajectory. The trajectory traced after the propulsive force is terminated and the body is acted upon only by gravity and aerodynamic drag.

casualty. Any person who is lost to the organization by having been declared dead, duty status-whereabouts unknown, missing, ill, or injured. (JP 1-02. Source: JP 4-02)

casualty estimate. The estimated total number of noncombatant and civilian casualties that result from military operations executed on a given target. Also called CE.

casualty factor. A number (either 1.0 or .25) that represents the fraction of personnel inside a collateral structure or outside in an outdoor area likely to become casualties.

certification. A formal indication of an individual's ability to perform a task to required standards.

civilian. A person who is not a member of the military and who is not taking a direct part in hostilities against a party to the conflict in an armed conflict.

collateral concern. A collateral object located within the final CHA after all mitigation techniques have been exhausted.

collateral damage. Unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. (JP 1-02. Source: JP 3-60)

collateral damage analysis. The examination or evaluation of relations between targets, target engagement options and NSEs to estimate or assess collateral damage.

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

Collateral Damage Estimate. An approximate calculation of potential collateral damage derived through analysis prior to target engagement.

Collateral Damage Estimation (CDE). The holistic process of determining the potential for collateral damage resulting from target engagement.

Collateral Damage Estimation Methodology (CDM). A body of joint standards, methods, techniques and processes to conduct collateral damage analysis and produce collateral damage estimates.

Collateral Damage Assessment (CDA). An analytical judgment derived by determining the amount and effects of collateral damage post target engagement.

collateral damage estimation/casualty estimation high. The calculated level of concern exceeds a specified level of risk to civilian and/or noncombatant personnel, facilities and/or environment around the target. Also called CDE/CE high.

collateral damage estimation/casualty estimation low. The calculated level of concern is below a specified level of risk to civilian and/or noncombatant personnel, facilities and/or environment around the target. Also called CDE/CE low.

collateral effects estimation. The comprehensive consideration of potential collateral effects (other than damage) resulting from nonlethal effects.

collateral effects radius/radii. A radius representing the largest collateral hazard distance for a given warhead, weapon, or weapon class considering predetermined, acceptable collateral damage thresholds that are established for each CDE level. Also known as CER. (Formerly known as Effective Miss Distance or EMD).

collateral hazard area. An area formed by measuring a CER from either the edge of a target/element outline, the aimpoint for a point target, or the edge of an engagement zone or artillery sheaf for an area target. Also called CHA.

collateral object. Civilian and noncombatant buildings, structures, vehicles, material or virtual entities that do not support the activities and/or functions of the enemy's military or fighting capability.

combat identification (CID). The process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision. Also called CID (JP 1-02. Source JP 3-09).

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

cyberspace. A global domain within the information environment consisting of the interdependent networks of information technology infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers (JP 1-02).

dual-use. Targets characterized as having both a military and civilian purpose/function.

enemy combatant. In general, a person engaged in hostilities against the United States or its coalition partners during an armed conflict. Also called EC. (JP 1-02. SOURCE: DODD 2310.1E) environmental hazard analysis. Analysis of significant human health implications resulting from exposure to contaminated air, water, and/or soil caused by collateral damage.

environmental hazard analysis. Analysis of significant human health implications resulting from exposure to contaminated air, water, and/or soil caused by weapons' employment.

friendly force tracking. The process of fixing, observing, and reporting the location and movement of friendly forces. Also called FFT. (JP 1-02. Source: JP 3-09)

Intelligence Community (IC). Elements of any department or agency as may be designated by the President, or designated jointly by the Director of National Intelligence and the head of the department or agency concerned, as an element of the IC. (Public Law 108-458, section 1073).

intergovernmental organization. An organization created by a formal agreement between two or more governments on a global, regional, or functional basis to protect and promote national interests shared by member states. Also called IGO. (JP 1-02. SOURCE: JP 3-08).

joint interagency coordination group. A staff group that establishes regular, timely, and collaborative working relationships between civilian and military operational planners. Also called JIACG. (JP 1-02. SOURCE: 3-08).

joint target list. A consolidated list of selected targets, upon which there are no restrictions placed, considered to have military significance in the joint force commander's operational area. Also called the JTL. (JP 1-02. SOURCE: JP 3-60).

lawful enemy combatant. Those combatants, who abide by the laws of war and who are entitled to protections under the Geneva Conventions.

# UNCLASSIFIED

CJCSI 3160.01B  
11 December 2015

Modernized Integrated Database. The national-level repository for the general military intelligence available to the entire Department of Defense Intelligence Information System community and, through Global Command and Control System integrated imagery and intelligence, to tactical units. This data is maintained and updated by the Defense Intelligence Agency. Commands and Services are delegated responsibility to maintain their portion of the database. Also called MIDB. (JP 1-02. Source: JP 3-13.1).

named areas of interest. The geospatial area or systems node or link against which information that will satisfy a specific information requirement can be collected. Also called NAI. (JP 1-02. SOURCE: JP 2-01.3).

noncombatant. Military medical personnel, chaplains, and those out of combat, including prisoners of war and the wounded, sick, and shipwrecked.

noncombatant and civilian casualty cut-off value. The casualty threshold for any anticipated effects, which if exceeded, would require the CCMD to forward a target to the Secretary of Defense or President for national-level review as a sensitive target unless delegated otherwise according to the established rules of engagement. Also called NCV.

nongovernmental organization. A private, self-governing, not-for-profit organization dedicated to alleviating human suffering; and/or promoting education, health care, economic development, environmental protection, human rights, and conflict resolution; and/or encouraging establishment of democratic institutions and civil society. (JP 1-02. SOURCE: JP 3-08).

No-Strike entities. Physical and virtual objects defined by the laws of war which are functionally characterized as civilian and/or noncombatant in nature and, therefore are protected from the effects of military operations under international law and/or rules of engagement.

No-Strike process. A process used to identify, analyze, verify, catalog, and disseminate information about entities that are to be protected from negative effects of military operations.

No-Strike list. A list of objects or entities characterized as protected from the effects of military operations under international law and/or rules of engagement. (JP 1-02. SOURCE: JP 3-60).

positive identification. The identification derived from observation and analysis of target characteristics including visual recognition, electronic support systems, non-cooperative target recognition techniques,

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

identification friend or foe systems, or other physics-based identification techniques. Also called PID. (SOURCE: JP 3-60).

precision-guided munition. A weapon that uses a seeker to detect electromagnetic energy reflected from a target or reference point and, through processing, provides guidance commands to a control system that guides the weapon to the target. Also called PGM. (JP 1-02. SOURCE: JP 3-09.1).

proficiency. The quality of having competence and a command of the fundamentals derived from practice and familiarity. A measure of how well a task is completed. An individual is considered proficient when he/she can perform tasks at the minimum acceptable levels of speed, accuracy, and safety.

qualification. Academic and task performance training designed to prepare an individual for a specific duty position, or for accomplishing a functional mission task; a prerequisite to establishing eligibility for additional training, mission task expansion, responsibility, and or certification.

responsible analytic center. The intelligence organization that has responsibility for specified topic(s) and/or issue(s) under the Defense Intelligence Analysis Program. Also known as RAC.

restricted target. A valid target that has specific restrictions placed on the actions authorized against it due to operational considerations. (JP 1-02. SOURCE: JP 3-60).

restricted target list. A list of restricted targets nominated by elements of the joint force and approved by the joint force commander. Also called RTL. (JP 1-02. SOURCE: JP 3-60).

rules of engagement. Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE. (JP 1-02. SOURCE: JP 1-04).

sensitive target. Those targets for which planned actions warrant the Secretary of Defense or President of the United States' review and approval.

serious injury. Incapacitation that will require personnel with wounds to receive treatment at a medical facility. This criterion is only used for risk and collateral damage estimates; it has no post-wounding time or tactical role associated with it.

# UNCLASSIFIED

CJCSI 3160.01B

11 December 2015

substantial structure. A structure with walls that can be expected to mitigate fragmentation (i.e. thick walls & few openings).

target. 1. An entity or object considered for possible engagement or other action. 2. In intelligence usage, a country, area, installation, agency, or person against which intelligence operations are directed. 3. An area designated and numbered for future firing. 4. In gunfire support usage, an impact burst that hits the target (JP 1-02. SOURCE: J P 3-60).

target location error. The difference between the coordinates generated for a target and the actual location of the target. Also called TLE. (JP 1-02. SOURCE: JP 3-09.3).

time-sensitive target. A JFC-designated target requiring immediate response because it is a highly lucrative, fleeting target of opportunity or it poses (or will soon pose) a danger to friendly forces. Also called TST. (JP 1-02. SOURCE: JP 3-60).

**(INTENTIONALLY BLANK)**  
**Inner Back Cover**

INTENTIONALLY BLANK  
(BACK COVER)