



CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION

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CJCSI 3160.01
13 February 2009

NO-STRIKE AND THE COLLATERAL DAMAGE ESTIMATION METHODOLOGY

References: See Enclosure E.

1. 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, treatment of collateral objects, and the collateral damage estimation (CDE) methodology (CDM).
2. Cancellation. CJCSM 3160.01B, 31 August 2007, "Joint Methodology for Estimating Collateral Damage and Casualties for Conventional Weapons: Precision, Unguided, and Cluster" and CJCSI 3227.01, 8 June 2007, "No-Strike Policy and Guidance" are canceled.
3. Applicability. This instruction applies to the Joint Staff, Services, combatant commands, DOD combat support agencies (CSAs), and joint activities.
4. Policy. See Enclosures B through D.
5. Definitions. See Glossary.
6. Responsibilities. See Enclosure A.
7. Summary of Changes. This update consolidates directives for CDE and the No-Strike process previously contained in CJCSM 3160.01B and CJCSI 3227.01 respectively. The material has been significantly reorganized. In addition, it adds objectives and standards for CDE training and certification as recommended by the JTCG/ME Collateral Damage Working Group (CDWG) and adopted by U.S. Joint Forces Command's (USJFCOM's) Joint Targeting School (JTS) as the CDE program of instruction (POI).

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9. Effective Date. This instruction is effective upon receipt.

For the Chairman of the Joint Chiefs of Staff



STANLEY A. MCCHRYSTAL
Lieutenant General, USA
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Enclosures:

- A -- Responsibilities
- B -- Collateral Objects, Dual-Use, and Human Shields
- C -- No-Strike Policy and Guidance
- D -- Joint Methodology for Collateral Damage Estimation
- E -- References
- GL -- Glossary

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ENCLOSURE A

RESPONSIBILITIES

1. This enclosure delineates responsibilities for the many organizations that execute and support the No-Strike guidance and CDE methodology. The Joint Staff Director for Intelligence (J-2) Deputy Directorate for Targets (Joint Staff/J-2T) is the lead agent for updates or changes to this instruction.

a. Joint Staff/J-2T. The Joint Staff/J-2T is responsible for the development of No-Strike and CDE policy and guidance for the Chairman of the Joint Chiefs of Staff (JCS). Joint Staff/J-2T fulfills this role via the Military Target Intelligence Management Structure in collaboration with combatant commands, the Joint Staff, and the national Intelligence Community (IC) (see glossary for IC delineation). The following are Joint Staff/J-2T roles and responsibilities specific to No-Strike and the CDM:

(1) Develop joint CDE policy and guidance.

(2) Coordinate with the combatant commands, Services, CSAs, and the Joint Technical Coordinating Group for Munitions Effectiveness (JTTCG/ME) to identify operational requirements that provide the framework for the CDM.

(3) Provide oversight of all CDM training. Maintain database of CDE trained and certified analysts via the Joint Staff/J-2T Secret Internet Protocol Routing Network (SIPRNET) Sharepoint site (includes name, rank, date trained, score, trained by, and last currency update). Validate requests for Services, combatant commands, or organizations desiring to establish a CDM training course. Coordinate the accreditation of those courses with USJFCOM/JTS.

(4) Validate new collateral damage information prior to its inclusion in the methodology.

(5) Provide oversight of population density tables to facilitate IC support and ensure their standardized production and use.

(6) Review and coordinate CDE automation requirements. Provide oversight of automated tool development to ensure policy, training, and tool automation is synchronized.

(7) Notify DOD components when new collateral effects radii (CER) tables are produced.

b. JTCG/ME. The JTCG/ME is a joint organization chartered under the auspices of the Services' logistics commands. It directs working groups that focus on specific aspects of weaponeering, weapon effects, and collateral damage. The following are JTCG/ME roles and responsibilities specific to CDM:

(1) Develop and publish weapons effectiveness information for conventional weapons. JTCG/ME, in coordination with the Joint Staff/J-2T, develops, maintains, and distributes the CDE reference tables that are the foundation for the CDM.

(2) Produce CDE reference tables separate from this instruction as new weapon's data become available. Tables will be produced no less than twice annually and distributed through the JTCG/ME SIPRNET Web site.

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

(4) Approve tools, sources, and methods used to display or calculate the CER values¹ for the CDE reference tables and weapon effectiveness data.

c. USJFCOM JTS. The JTS is the only DOD formal schoolhouse that provides joint targeting training for operations and intelligence personnel designated to Unified Commands, the Joint Staff, Defense agencies, and Service targeting coded positions. As part of its curriculum, JTS teaches CDM and is currently the only school accredited to do so. The following are JTS' roles and responsibilities specific to CDM:

(1) Maintain the POI standard for DOD CDE training and instructor certification.

(2) Provide CDE training for personnel detailed to a position or billet performing CDE.

(3) Maintain at least one standardization instructor as the course manager capable of certifying instructors to teach the POI.

(4) Validate the POI to be taught by other organizations, and certify their instructors after approval for the course is validated by Joint Staff/J-2T. Requesting organizations are responsible for funding their courses to include the training of their instructors and the validation of their course.

¹ Formerly known as Effective Miss Distance or EMD values.

(5) Keep record of CDE trained analysts and instructors who graduate from JTS (name, rank, date, and score). Input data into the Joint Staff/J-2T Sharepoint site.

(6) Comply with Appendix E to Enclosure D.

d. Combatant Commands. Combatant command commanders (CCDRs) must apply the CDM to mission specific Rules of Engagement (ROE) and higher commander's guidance during the planning and conduct of full spectrum operations. Due to the nature of operations and the strategic risk they may pose to the U.S. government, due diligence is critical in ensuring personnel are trained in the CDM in accordance with (IAW) Appendix E to Enclosure D. The following are combatant command roles and responsibilities specific to No-Strike and the CDM:

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

(2) Ensure area of responsibility (AOR) specific certification standards are established and maintained prior to a trained CDE analyst performing assessments.

(3) Ensure training and certification requirements are met and proficiencies maintained for the duration of an individual's assignment. Update analyst's initial certification and annual currency via the Joint Staff/J-2T SIPRNET Sharepoint site. Personnel trained after 30 December 2005 on CJCSM 3160.01B are grandfathered by this CJCSI including those trained by USCENTCOM's mobile training team (MTT). The MTT was the basis for the course now being taught at JTS. Any work those trained CDE analysts performed or will perform is backed by this CJCSI. Combatant commands should review data via normal timelines.

(4) If desiring to establish training separate from the JTS, send a letter of intent to Joint Staff/J-2T IAW Appendix E to Enclosure D. JTS will train the instructors and certify the POI's implementation via an audit of the course. Requesting organizations are responsible for funding their courses to include the training of their instructors and the validation of the course. After certification, course must use the JTS CDM course POI, instructor certification process, and course materials as produced and approved by USJFCOM/JTS to ensure joint standardization. Combatant commands establishing separate training will update Joint Staff/J-2T's Sharepoint database with graduates of their course.

(5) Present the appropriate information as directed by this instruction and CJCSI 3122.06, Sensitive Target and Review (STAR) Process (reference d).

(6) Ensure population density tables are developed and kept current IAW this instruction for all plans as directed in reference i.

(7) Ensure imagery used to support CDE assessments is not older than 90 days. This is waived to 180 days if there are no indications of change in the area of interest.

(8) Geographic CCDRs. Supported by the IC, geographic CCDRs are responsible to identify, develop, maintain, and distribute to subordinate and supporting commands and supported functional commands a list of No-Strike entities (known as the No-Strike list (NSL)) for operation-specific assigned AORs, and for those countries within their Unified Command Plan assigned AOR for which there is Guidance for the Employment of the Force (GEF) documentation (formerly known as Contingency Planning Guidance) or Joint Strategic Capabilities Plan directed plans and/or operational orders (OPORDs).² The geographic CCDR, as the approving authority for the NSL, should designate a single No-Strike Coordinator to manage the process (see Enclosure C).³

(9) Functional CCDRs. Functional combatant commands with worldwide responsibilities are responsible for coordinating with geographic combatant commands to leverage relevant country-based NSLs maintained for their respective countries of interest. It is critical for the functional combatant command to aggressively coordinate with supporting geographic combatant commands to ensure NSLs for countries of interest are current and valid (see Enclosure C).

e. Services. Due to the nature of operations and the strategic risk they may pose to the U.S. government, due diligence is critical to ensure personnel are trained in the CDM IAW Appendix E to Enclosure D. The following are Service roles and responsibilities specific to CDM:

(1) Ensure that personnel detailed to a position or billet that may require them to perform CDE are trained and certified in the CDM.

(2) Ensure personnel detailed to CDE position attend JTS CDM course or its mobile training team (MTT). Personnel trained after 30 December 2005 on CJCSM 3160.01B are grandfathered by this CJCSI including those trained by USCENTCOM's MTT. The MTT was the basis for the course now being taught at

² Enclosure F of the JSCP provides Intercommand Targeting Guidance.

³ For all other countries within an AOR, geographic CCDRs should compile NSLs to support crisis action planning as necessary. However, Modernized Integrated Database (MIDB) maintenance as done by Responsible Analytic Centers (RACs) is guided by the Defense Intelligence Analysis Program (DIAP) priorities. Those commands that elect to maintain an NSL for countries outside direction provided in subparagraph 3.b(1) cannot be assured of MIDB record detail to the level afforded DIAP priority countries. Each geographic combatant command and RAC must have procedures to task and respond effectively IAW crisis action planning criteria for non-priority countries.

JTS. Any work those trained CDE analysts performed or will perform is backed by this CJCSI. Combatant commands should review data via normal timelines.

(3) Services should establish (or leverage existing) appropriate special skill/experience identifiers to facilitate the tracking of certified CDE analysts.

(4) If desiring to establish training separate from the JTS, send a letter of intent to Joint Staff/J-2T IAW Appendix E to Enclosure D. JTS will train the instructors and certify the POI's implementation via an audit of the course. Requesting organizations are responsible for funding their courses to include the training of their instructors and the validation of the course. After certification, courses must use the JTS CDM course POI, instructor certification process, and course materials as produced and approved by USJFCOM/JTS to ensure joint standardization. Services establishing separate training will update Joint Staff/J-2T's Sharepoint database with graduates of their course.

(5) Provide a standardized tool approved by JTCG/ME for use in CDE to support DOD requirements. Current authorized tools are Joint Automated Deep Operations Coordination System and Fast Assessment Strike Tool-Collateral Damage.

f. DOD CSAs/Service Intelligence Production Centers. CSAs and Service Intelligence Production Centers are responsible for identifying and reporting No-Strike entities to the appropriate Responsible Analytic Center (RAC) through GEMINI (see Enclosure C Appendix A, subparagraphs 2.b. and 2.c). CSAs and Service Intelligence Production Centers are responsible for assigning their own No-Strike Coordinator to serve as the POC who has the access and skills necessary to support the No Strike Process for their command. Efforts include recommendation of No-Strike entities, their functionality, location, and geospatial definition in the Modernized Integrated Database (MIDB). Ideally, this would include the capture of a geospatially accurate polygon (shape file) of the No-Strike facility outline and its storage in a community accessible database such as Target Management System (TMS). Other responsibilities include supporting the target vetting process by characterizing and/or verifying the functionality of entities under consideration for attack. The MIDB is the vehicle used to archive and maintain entity identification and characterization information, to include No-Strike entities (see Enclosures B and C). Finally, the CDE process requires casualty estimates for Level 5 assessments. Combatant commands are required to develop and maintain the demographic data for countries and/or regions in their AOR to support operational planning and execution; however, the IC is required to support this effort as needed and requested by the combatant commands. (See Enclosure D).

g. The 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 assessments. 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 assessments.

h. The Defense Intelligence Agency's (DIA) National Center for Medical Intelligence (NCMI). NCMI is responsible for assessing significant human health risks associated with exposure to chemical contamination of air, food, water, or soil; and with exposures that may result from accidental or intentional releases of toxic industrial chemicals. In addition, the NCMI maintains the expertise and capability to identify and assess medical facilities in order to preserve and avoid collateral damage to medical infrastructure. The NCMI does not assess health risks from the use of CBR weapons or from CBR releases from collateral damage. NCMI's population data requirements are documented with the IC for production and maintenance in order to support CDE assessments.

i. Other organizations. Although not bound by this instruction, non-DOD United States Government agencies, e.g., Department of State, and Coalition partners should report operating locations in an AOR to the appropriate command element or joint task force (JTF) to facilitate command and interagency coordination, and deconfliction of No-Strike entities that occur via the joint interagency coordination group (JIACG) (see reference g).

j. It is an inherent responsibility of all commanders, observers, air battle managers, weapons directors, attack controllers, weapons systems operators, intelligence analysts, and targeting personnel to:

(1) Establish positive identification (PID) and to accurately locate targets consistent with current military objectives and mission specific ROE. **PID is defined as "the reasonable certainty that a functionally and geospatially defined object of attack is a legitimate military target in accordance with the Law of War and applicable ROE."**

(2) Identify potential collateral concerns prior to munitions release and target engagement (provide function and geospatial delimitations if able).

(3) Apply the CDM with due diligence to mission objectives, force protection, and collateral damage.

ENCLOSURE B

COLLATERAL OBJECTS, DUAL-USE, AND HUMAN SHIELDS

1. Introduction. Objects defined by the Law of War (LOW) as functionally civilian or noncombatant in nature are considered protected or collateral objects⁴ (reference a). Knowledge of collateral objects is essential to target development, the No-Strike process, and the CDM. Protected or collateral objects will be treated in accordance with policy and guidance prescribed in this instruction and operational ROE.

2. Protected or Collateral Object Categories. Collateral objects are divided into two categories based on their sensitivity. Objects are represented by MIDB classification category codes (CATCODES) for the purposes of intelligence production, target development, and as a standardized description of each category. Table B-1 and B-2 below show the collateral objects by category type and tie specific CATCODEs to their description (number in parenthesis).

a. Category I Protected or Collateral Objects. This category includes the most sensitive subset of objects defined by the LOW. These objects typically comprise the core of the NSL (see Enclosure C, Appendix A). An operation's ROE may dictate other categories for the supporting NSL.

(1) Diplomatic offices, foreign missions, and sovereign nonmilitary property of other nations within the AORs.

(2) Religious, cultural, historical institutions, 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, and institutes.

(6) Civilian refugee camps and concentrations.

(7) Prisoner of war camps and concentrations and government detention facilities/prisons.

(8) Facilities whose engagement may result in pollution that cannot be contained to include contamination of standing water, streams, and rivers.

(9) Dams or dikes whose engagement may result in the flooding of civilian areas.

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
42140	Thermal Power Plants, Nuclear (8)
43110	Water Supply Facilities, Treatment Plants (8)
43121	Water Supply Facilities, Storage Facilities, Reservoirs (9)
43210	Sewage Waste Facilities (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, Day Care (5)

⁴ Also known as the Law of Armed Conflict (LOAC).

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
49650	Nonmilitary Schools, Madrassas (5)
<u>72000</u>	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)
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, Non-Military (7)
77520	Government Detention Facilities, Prisons, Military (7)
77600	Religious, Cultural and Historical Institutions, General (2)
77610	Religious Institutions (2)
77620	Cultural and Historical Institutions (2)
77630	Cemeteries (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)
77840	Diplomatic Residences (1)
77850	Foreign Missions and Government Offices (1)
77860	Designated Assembly Areas (1)
77870	Nongovernmental Organizations (3)

Table B-1. Category I Collateral Objects (U)

b. Category II Protected or Collateral Objects. This category includes the remainder of objects defined by the LOW and may be on the NSL.

(1) Nonmilitary billeting and accommodations including private civilian housing and family housing on military or government property.

(2) Civilian meeting places including athletic fields, stadiums, racetracks, parks, civic and convention centers, theaters, amusement parks, markets, and recreational facilities.

(3) 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.

(4) Agricultural processing and storage facilities that market or distribute foodstuffs for civilian consumption.

(5) Facilities and/or structures for which the functionality/purpose is unknown are classified as Category II Protected or Collateral Objects.

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
18200	Agricultural Raw Materials, Vegetables, General (4)
18210	Agricultural Raw Materials, Grain Storage, General (4)
18211	Agricultural Raw Materials, Grain Storage, Underground or Earth-Covered Bunkers (4)
18212	Agricultural Raw Materials, Grain Storage, Elevators (4)
18213	Agricultural Raw Materials, Grain Storage, Horizontal Bulk (4)
18214	Agricultural Raw Materials, Grain Storage, On-Farm (4)
<u>42000</u>	Electrical Power Generating, Transmission, and Control (3)
42100	Thermal Power Plants, General (3)
42110	Thermal Power Plants, Steam Turbine (3)
42120	Thermal Power Plants, Gas Turbine (3)
42130	Thermal Power Plants, Diesel (3)
42150	Thermal Power Plants, Geothermal (3)
42190	Thermal Power Plants, Combination (3)
42200	Hydroelectric Power Plants, General (3)
42210	Hydroelectric Power Plants, Storage, General (3)
42211	Hydroelectric Power Plants, Storage, Base-of-Dam (3)
42212	Hydroelectric Power Plants, Storage, Diversion (3)
42220	Hydroelectric Power Plants, Run-of-River, General (3)
42222	Hydroelectric Power Plants, Run-of-River, Diversion (3)
42230	Hydroelectric Power Plants, Pumped Storage (3)
42240	Hydroelectric Power Plants, Tidal (3)
42290	Hydroelectric Power Plants, Combination (3)
42300	Alternate Energy Power Plants (3)
42600	Electrical Power Substations, General (3)
42610	Electrical Power Substations, Transformer (3)
42620	Electrical Power Substations, Switching (3)
42630	Electrical Power Substations, Traction (3)
42640	Electrical Power Substations, Converter (3)
42650	Electrical Power Capacitor Substations (3)
42660	Electrical Power Taps (3)
42700	Electrical Power Control Centers (3)
<u>43000</u>	Public Utilities (3)

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
43010	Urban Utility, Steam Heating Plant (3)
43100	Water Supply Facilities, General (3)
43120	Water Supply Facilities, Storage Facilities, General (3)
43122	Water Supply Facilities, Storage Facilities, Tanks (3)
43123	Water Supply Facilities, Storage Facilities, Towers and Standpipes (3)
43130	Water Supply Facilities, Pumping Stations (3)
43140	Water Supply Facilities, Sources, General (3)
43141	Water Supply Facilities, Sources, Wells (3)
43142	Water Supply Facilities, Sources, Springs (3)
43143	Water Supply Facilities, Sources, Rivers or Streams, Intake Points (3)
43144	Water Supply Facilities, Sources, Lakes, Intake Points (3)
43145	Water Supply Facilities, Sources, Salt Water Bodies, Intake Points (3)
43150	Water Supply Facilities, Irrigation Pump Stations (3)
43160	Water Supply Facilities, Water Pipeline Segments (3)
43190	Water Supply Facilities, Water Drilling Towers (3)
43200	Waste Facilities, General (3)
43220	Waste Facilities, Solid Waste Processing, General (3)
43221	Waste Facilities, Solid Waste Processing, Transfer Stations (3)
43222	Waste Facilities, Solid Waste Processing, Landfills (3)
43300	Mass Transit Facilities, General (3)
43310	Mass Transit Facilities, Barns And Parks (3)
43320	Mass Transit Facilities, Repair Plants (3)
43330	Mass Transit Facilities, Combined Parking and Repair Facilities (3)
43340	Mass Transit Facilities, Subway Facilities or Heavy Rail (3)
43500	Urban Gas Supply, General (3)
43510	Urban Gas Supply, Gas Manufacturing (3)
43520	Urban Gas Supply, Gas Storage, General (3)
43521	Urban Gas Supply, Gas Storage, Gasholders (3)
43522	Urban Gas Supply, Gas Storage, Storage Tanks (3)
43523	Urban Gas Supply, Gas Storage, Reservoirs, Underground (3)
43530	Urban Gas Supply, Gas Storage, Bottling Plants (3)
43600	Fire Stations (3)
43700	Postal Facilities (3)
44400	Ferry Facilities, Highway, General (3)
<u>46000</u>	Urban Services, General (3)
46100	Non-Military Motor Services (3)
46110	Commercial Fuel Service Stations (Gas) (3)
46120	Non-Military Motor Pools (3)
46200	Recreational Facilities, Athletic Fields, Parks, Civic Centers, Theaters, General (2)

<u>MIDB CATCODE</u>	<u>FUNCTION</u>
46210	Recreational Facilities (2)
46220	Athletic Fields (2)
46230	Stadiums (2)
46240	Race Tracks (2)
46250	Parks (2)
46260	Civic and Convention Centers (2)
46270	Theaters (2)
49700	Nonmilitary Billeting and Accommodations (1)
49710	Hotels, Motels, Inns to Include Hotels Motels, Inns, Bed and Breakfasts, and Hostels (1)
49720	Apartment Complexes (1)
49730	Residences, Non-Diplomatic (1)
58900	Food, Feed, Beverage, and Tobacco Storage (4)
<u>77000</u>	Trade, Commerce, and Government (3)
77100	Merchandising and Marketing (3)
77110	Retail Market and Department Store (3)
77120	Market, General (3)
77130	Department Store, General (3)
77140	Restaurants (3)
77200	Financial Institutions, General (3)
77210	Central Government Banking, Financial, Economic, Commercial, Treasury or Trade Organizations (3)
77220	Domestic Banking, Insurance, Finance, Exchanges, Brokerage Houses or Gambling Establishments (3)
77230	Foreign Banking, Insurance, Finance, Exchanges, Brokerage Houses or Gambling Establishments (3)
77240	Currency Dealers and Exchangers, Check Cashers, Money Transmitters or Hawala--Money Services Businesses (MSBS) (3)
77250	Global or Regional Lending Organizations Formed by Treaty or International Agreement -- Intl Financial Institutions (IFIS) (3)
77900	Trade, Commerce, and Government (3)
77910	Stock Market (3)
77920	Chamber/Department of Commerce (3)
78100	Civil Defense Facilities, General (3)
78110	Civil Defense Facilities, Population Protection (3)
78120	Civil Defense Facilities, Civil Defense Training Facilities (3)
78130	Civil Defense Facilities, Civil Defense Forces Facility (3)
78140	Civil Defense Facilities, Civil Defense Reserve Storage Facilities (3)

Table B-2. Category II Collateral Objects (U)

c. Protected or collateral object categories may be modified by the Secretary of Defense (SecDef) or President as the military or political situation dictates. Changes to these categories will be reflected in operation specific ROE.

3. Dual-Use Targets

a. Targets characterized as having both a military and civilian purpose/function are characterized as dual-use. In most cases, dual-use targets consist of facilities/structures 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 the civilian population and the military effort.

b. Dual-use targets may also consist of LOW protected facilities/structures occupied by combatants. LOW protected structures occupied by enemy combatants for the purpose of advancing military objectives lose their LOW protection and are not classified as dual-use (provided the adversary has been put on notice). Similarly, if the function of a collateral object is determined to be supporting military operations and/or objectives exclusively, it is not classified as dual-use. Such entities are not considered collateral damage or No-Strike concerns and may be deemed lawful targets IAW reference a (also see Enclosure C, subparagraph 2.c. and supporting footnote).

c. Commanders are responsible to determine the predominant function of LOW protected structures, based on current intelligence, and decide if the target is dual-use or not. The ROE for a specific operation provides the authorizations and/or prohibitions for targeting dual-use objects. Regardless of the ROE in effect, civilian personnel working within the boundary of dual-use targets must be considered as noncombatant casualties for the purpose of casualty estimation under guidance provided in Enclosure D.

4. Human Shields. Human shields are civilian or noncombatant personnel placed around a valid military target by a combatant to hinder attack of that target. In some instances, human shields are willing accomplices who support the belligerent nation and in this case they lose their protected status and are valid military targets. In other instances, the belligerent nation may forcibly place civilians or noncombatants at valid military targets and these personnel are considered protected persons and should not be targeted. Only involuntary human shields must be accounted for in casualty estimation. If the status of the human shields is not known, then the more restrictive rule applies, and they are to be protected as protected persons/collateral objects.

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ENCLOSURE C

NO-STRIKE POLICY AND GUIDANCE

1. Introduction

a. No-Strike entities⁵ are those designated by the appropriate authority upon which kinetic or non-kinetic operations are prohibited to avoid violating international law, conventions, or agreements, or damaging relations with coalition partners and indigenous populations. The infliction of unnecessary suffering or damage to civilian persons or property that is excessive in relation to the concrete and direct military advantage anticipated is inconsistent with international law and is contrary to DOD policy outlined in this document and in references a and b.

b. The source and method for defining a person, place, or thing as a No-Strike entity is derived primarily from the body of international law collectively known as LOW. The 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.

2. General Guidance

a. The LOW requires all military personnel to take reasonable precautions to ensure that only military objectives are targeted and to ensure that civilian or noncombatant objects are not made the object of attack. NSLs identify and functionally characterize LOW protected No-Strike entities, forming the strategic and operational basis for target de-confliction during operational planning, CDE within the target development process, and the de-confliction of Joint Fires during operational and tactical execution. See Enclosure D for additional guidance on CDE.

b. No-Strike Entities. No-Strike entities can be both traditional and non-traditional in nature,⁶ and consist of objects which are functionally characterized as civilian and/or noncombatant and therefore are prohibited from attack. No-Strike entities 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

⁵ Also sometimes referred to as collateral objects for the purposes of CDE. See Enclosures B and D.

⁶ For the purposes of this instruction, the term "traditional" refers to physical entities such as facilities, units, and other entities geospatially located within the geographic area of operation. The term "non-traditional" refers to entities that are more abstract in nature and are usually associated with trans-national information technology and global economic structures. These "non-traditional" entities may include objects such as computer networks, Web sites, IP addresses, bank accounts, etc.

the enemy's war-fighting or war-sustaining capability. These entities are generally not lawful targets under normal circumstances; however, if used for the furtherance of military or hostile force objectives, No-Strike entities lose their protected status and may be subject to attack, provided the adversary has been put on notice. For example, if a hospital structure is used to store weapons or is used for some other military purpose, a warning must be given and if unheeded, the facility forfeits its protected status under the LOW and becomes a lawful military target. When such a change in status occurs, the CCDR or authorized designee may approve the entity for attack (see Appendix B to this Enclosure, paragraph 6, for change of status guidance).

c. No-Strike Entities Located on Military Installations. When located on installations determined to be lawful military targets, No-Strike entities should be evaluated for collateral damage concerns and mitigated IAW Enclosure D. It must be assumed these entities host protected functions unless confirmed otherwise.⁷ No-Strike entities must be geospatially defined, developed as separate facilities, and assigned a functional category code and O-suffix, as appropriate. Proximity of lawful military targets to No-Strike entities 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. In making the decision, commanders must consider the military necessity for attacking the target, proportionality of the means planned for target engagement, and reasonableness within the framework of operational objectives.

d. No-Strike Entities Versus Restricted Targets. Restricted targets are different from No-Strike entities. Restricted targets are those valid military targets which support the attainment of operational objectives, but which have been restricted from specified means of effects or engagement for operational, political, intelligence gain/loss, environmental, collateral damage, and/or ROE considerations.⁸ CCDRs are required to identify, develop, maintain, and distribute a list of restricted targets (known as the restricted target list (RTL)) for tasked plans and/or operational orders (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.

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

⁸ Valid targets are those that have been vetted as, "A part of target development that ensures all vetted 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 e.

3. The No-Strike Process

a. General. 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 non-military entities. Specific instructions on database and NSL development are provided in the appendices to this enclosure.

b. Identification, Characterization, and Nomination

(1) Identification, characterization, and nomination of No-Strike entities are the first steps in the No-Strike process. All stakeholders have the responsibility to identify and characterize the functionality of No-Strike entities as accurately as possible, and report this information to the responsible combatant command, JTF, or responsible U.S. government department or agency in a timely manner. Every effort shall be made to validate No-Strike entity nominations; however, timeliness of the reporting is critical during the conduct of military operations.

(2) To increase the accuracy and currency of reporting on facilities, combatant commands should encourage organizations to periodically provide a Global Positioning System (GPS) quality center-point and corner points defining the facility boundary for each potential No-Strike entity of interest along with an expected duration of occupancy. Street addresses and/or general descriptions of facility locations are of little use for geospatially defining No-Strike facilities. This information is essential to the collateral damage process and also allows more efficiency via automated tools.

c. Development. No-Strike entities require the same accuracy in location and geospatial definition as that of lawful military targets. Accurate positioning and geospatial development of No-Strike entities and identification of collateral damage/effects concerns is part of both the deliberate and dynamic targeting processes and is a continuous process that does not end when military operations commence (see reference e for detailed discussion on the deliberate and dynamic targeting processes). The continuous identification and development of No-Strike entities, well in advance of and throughout military operations, is critical to campaign success.

d. List Generation and Maintenance. NSL generation and maintenance must be an assigned task with frequent and routine reviews by the combatant command No-Strike Coordinator. Participation by stakeholders and validation by the appropriate agencies will yield additions, changes, and/or deletions to the NSL 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. NSL approval is a CCDR responsibility and the procedures governing NSL approval are a command function.

e. Dissemination. After approval, the geographic CCDR will 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. See Appendix B to this Enclosure for additional guidance on NSL dissemination.

f. Execution. Deliberate and dynamic targets must be validated against the latest NSL prior to attack. CDE and mitigation will be accomplished IAW Enclosure D and the governing ROE for the particular operation. Targets that cannot be mitigated for collateral damage will be forwarded for review and approval IAW reference d.

g. Follow-on Operations. Traditional No-Strike entities typically consist of facilities and locations that are 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 combat operations. By limiting unnecessary suffering and disproportionate 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 A TO ENCLOSURE C

DATABASE DEVELOPMENT

1. No-Strike Entity Identification, Nomination, and Development

a. The following set of MIDB CATCODEs will be used as the core foundation for NSLs (for any country or operation); they are listed *in priority order* of importance for IC production and validation of record accuracy.⁹ This list represents the CATCODEs that must be used to develop an NSL due to LOW; however, it is not all inclusive. Combatant commands may have other categories reflected on the NSL based on theater ROE. See Enclosure B for additional detail regarding these categories.

778XX	Diplomatic Facilities, Foreign Missions, and Nongovernmental Organizations
776XX	Religious, Cultural, Historical Institutions
434XX	Medical Facilities
721XX	Medical Schools
72300	Medical Interest Site
496XX	Civilian Schools
75300	Civilian Refugee Camps
75900	Prisoner of War Camps
775XX	Government Detention Facilities
43210	Sewage Waste Facilities
439XX	Dams
438XX	Dikes and Other Water Control Features
77700	Libraries

Table C-A-1. Core No-Strike List Category Codes

b. Production Prioritization. If there is an existing joint target list (JTL) and/or RTL, they shall be used to focus the IC and prioritize their MIDB production and review efforts for possible No-Strike entities. 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, combatant command personnel shall attempt to refine the scope of effort for the IC by geographic/regional priority. For urban areas, the priority is as follows:

⁹ Categories 41500, 41510, and 41520, Computer Networks, Computer Networks Service Providers, and Computer Networks, Information Production and Storage respectively, are also potential No-Strike categories depending on the protected function they support (i.e., Hospitals, Water Control, etc.).

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

Table C-A-2. Urban Area Priority List

c. Development. No-Strike entities must be named distinctly with an assigned identification (e.g., basic encyclopedia (BE)) number/O-suffix) and classified by their functionality with an appropriate CATCODE IAW reference c. Facilities must be geospatially defined as discrete entities with a precise GPS quality geographic center and corner point boundaries. They must be entered in MIDB to support validation by the appropriate authority and realistic target deconfliction during the conduct of combat operations. If required, combatant commands may request IC support for No-Strike entity development. Development of new nominations should be requested via the nomination-database change request (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. Coordinate Generation. Coordinates relating to physical No-Strike entities are produced and maintained in MIDB. Accurate positioning of physical No-Strike entities is essential for minimizing collateral damage and critical to the CDE process.¹⁰ Since automated CDE tools depend on accurate plots of the NSL to ensure valid CDE results, care must be exercised in the methods used to derive No-Strike entity locations. Coordinate sources listed below 1 meter controlled image base (CIB) on Table C-A-3 are not accurate enough to provide reliable depictions using automated CDE tools. Properly acquired GPS coordinates should be used to cue and further refine No-Strike locations on imagery (reference k). Orthorectified mono imagery should be

¹⁰ Although related here in the context of traditional No-Strike entities (i.e., entities such as facilities, units, geographic areas, etc.), accurate identification and location of non-traditional No-Strike entities (i.e., cyberspace elements) are just as important to deconflict against kinetic fires and minimize collateral damage/effects on noncombatant and civilian functions.

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

Priority	Coordinate Source
1	Digital Point Positioning Database
2	Precise Orthorectified Image Datasets
3	CIB 1 Meter
4	CIB 5 and 10 Meter
5	Uncontrolled National Technical Means Imagery with Rapid Positioning Capability

Table C-A-3. Sources for Deriving Positional Data

2. New Nominations

a. No-Strike entity information is likely to come from a variety of sources (particularly after an operation begins): CSAs, Services, Components, JIACG, Coalition partners, Interagency partners, etc.... Regardless of source, each stakeholder must nominate No-Strike entities for MIDB entry through the GEMINI portal.¹¹ If stakeholders do not or cannot have access to GEMINI then they must pass the required information to the appropriate combatant command No-Strike Coordinator for data entry into GEMINI.

b. Stakeholders may not regularly communicate with combatant commands and the information they provide may be either incomplete or difficult to validate. To facilitate the positive identification, location, and validation of No-Strike entities, combatant commands may utilize the JIACG, as well as command CSA and coalition partner liaisons. Despite the GEMINI process outlined above, combatant commands can expect to receive information from interested parties by fax, phone, e-mail, or visits from stakeholders. Commands must reach-out to subordinate commands, allies, coalition partners, host nation, and the JIACG to refine No-Strike entity information and encourage stakeholder participation and feedback.

c. DIA's GEMINI Web-based portal for production and dissemination of MIDB facility and unit-related intelligence is the approved method for nominating new possible No-Strike entities. When doing so, agencies shall follow the NOM-DCR guidelines and procedures established within GEMINI. As nominations are developed, agencies shall provide as much information as possible. Location and source of information is critical. Identify the entity by

¹¹ Currently applies to traditional No-Strike entities only. See Appendix B, paragraph 2.b.

CATCODE to ensure it is forwarded to the correct RAC. Agencies should ensure contact information in GEMINI profile is current.

d. Important attributes in reporting potential new No-Strike entities include, but are not limited to: date of nomination, country, entity name, coordinates (suggested format DD.MM.SS.SSSX/DDD.MM.SS.SSSX) or location with GPS or priority 1, 2, or 3 coordinate sources preferred using World Geodetic System 1984 (WGS-84) Datum (see Table C-A-3), coordinate accuracy, perimeter boundary, number of personnel at the facility and work schedules (if known). Important attributes for reporting and/or nominating virtual No-Strike entities include internet protocol (IP) or uniform resource locator (URL) 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 validation purposes.

APPENDIX B TO ENCLOSURE C

THE NO-STRIKE LIST

1. Overview

- a. Purpose. To provide combatant commands practical guidance in developing and compiling the NSL for their operations.
- b. Responsibilities. See base instruction, paragraph 4. Internal authority for NSL approval within combatant commands will vary between commands and operations. As a practical matter, the Joint Staff recommends that the NSL, RTL, and JTL have the same approval authority for a given operation; however, given the mission critical importance of NSL accuracy, dissemination of NSL updates should be dynamic, providing timely situational awareness of newly identified No-Strike entities.

2. NSL Generation

- a. No-Strike Categories. Querying a core set of MIDB CATCODEs via GEMINI can begin generation of the NSL (see Table C-A-1). 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 combatant commands in coordination with the Joint Staff based on approved operational ROE and as the military and political situation dictates.
- b. Non-Traditional No-Strike Entities. Guidelines for automated NSL generation contained in this instruction currently apply only for traditional No-Strike entities produced and maintained in MIDB. If required, entry of non-traditional No-Strike entities (i.e., individuals, accounts, computer networks, etc.) on NSLs may be manually accomplished until production policy, capability, and standardized procedures to database these entities mature. The JS/J-2T will update this instruction as policy, capability, and procedures develop for the handling and databasing of non-traditional No-Strike entities.
- c. Automated Production. In addition to querying CATCODEs in MIDB, there are also a number of ways to automate NSL generation. Two of the most prominent methods include the Joint Targeting Toolbox and the MORPHEUS portal. 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, and coordinate derived (sorted in that order, from left to right). Lists should be saved with the naming scheme "DRAFT-(two letter country code)-NO-STRIKE-DDMMMTTTTZ."

d. 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 JADOCs. Combining NSL entities in an overlay with geospatial intelligence, tasking and/or fires orders, and other operational data provides target planners enhanced situational awareness in collateral damage avoidance, particularly for dynamic targeting.

3. NSL Validation and No-Strike Entity Verification

a. Once the NSL is created, combatant commands must verify entities on the NSL are not on the JTL/RL and vice versa. Whenever there is a change in either the NSL or the JTL/RTL, combatant commands must compare the two lists to look for new 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. DIA is the RESPROD for all No-strike facility CATCODEs. All No-Strike facility nominations go to DIA for approval, which includes verification that the CATCODE is accurately attributed. Therefore, DIA is responsible for verifying that a No-Strike facility is indeed a No-Strike facility. Further verification should be done by the combatant commands for database errors, problems, and/or inconsistencies. These should include:

- (1) Inaccurate, incorrect, or city center coordinates.
- (2) Multiple identification numbers and/or names for the same entity.
- (3) Mismatched identification numbers and entity names.
- (4) Improperly assigned CATCODE and/or O-suffix.
- (5) Single entity identification numbers listed with multiple CATCODEs (the NSL should only reflect items with appropriate No-Strike CATCODEs).

c. Un-verified Entities. At the discretion of the combatant command, un-verified 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, then early addition to the NSL is a prudent action.

d. In circumstances where No-Strike entities are found within the physical boundaries of a lawful military target, the lawful target is placed on the JTL and the No-Strike entity is placed on the NSL. The two may share the same identification (e.g., BE, unit ID) number but would be differentiated by CATCODE, O-suffix, and, in many cases, entity name. Proximity does not preclude engagement of the lawful target as long as any conflict between the No-Strike entity and lawful target is resolved IAW Enclosure B and requisite approvals sought, if necessary, IAW reference d.

e. Whenever there is a change in either the NSL or the JTL, combatant commands must validate the two lists to look for new discrepancies. For dynamic targeting, each lawful target must be run against the NSL to ensure the target is not a protected entity, and to conduct collateral damage estimation and mitigation as necessary. When applicable, a check of the JTL against the RTL will ensure that individual RTL target restrictions are not violated.

4. NSL Coordination and Approval

a. IC members as part of the IC target vetting process should provide feedback on potential No-Strike entities to the combatant commands. Combatant commands should provide continuous NSL access for IC review.

b. The Joint Staff recommends further coordination of the NSL with appropriate functional elements of the combatant command 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.

c. Once the initial NSL is approved, the list is re-saved to reflect its final status (remove "DRAFT" from the naming convention). In addition, combatant commands must establish procedures for updating the NSL based on the needs of the mission and no less than once annually. 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.

d. Combatant commands are encouraged to automate the process of associating No-Strike entities to the NSL based on country and DIA-approved CATCODEs. This automated process ensures that the NSLs are continuously updated and reflect the latest intelligence available. In this situation, the concept of the NSL approval can now be accomplished through having the automated NSL generation approved. In other words, if appropriate authority within the combatant command approves of the CATCODES used for the NSL and the automated process by which an NSL is generated, then the NSL itself is approved.

5. NSL Dissemination

a. The primary means of disseminating NSLs is over the MIDB and GCCS replication architecture to Joint Worldwide Intelligence Communications Systems, SIPRNET, coalition systems, and other command directed battle management systems for use by target planners and Joint/Service fires and effects coordinators.

b. Secondary mechanisms will likely 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. Combatant commands are responsible for timely updates to the NSL as changes are identified. Delaying the dissemination of changes to the NSL increases the risk of unnecessary and unintended collateral damage.

6. Change of Status

a. No-Strike entities that lose their protected status should be removed from the NSL. No-Strike entities lose their protected status if they are used for a military purpose. In such cases, they become lawful military targets. For example, if a hospital or a place of worship is used for a purpose that is inconsistent with its protected status, such as storing weapons, housing combatants or unlawful belligerents, or functioning as an observation post, the facility loses immunity from attack under the LOW and is subject to attack, provided the adversary has been put on notice and the notice has gone unheeded. It is a combatant command responsibility to determine the predominate functionality of a facility.

b. Upon losing protected status, the entity's MIDB record must be updated to reflect the new characterization. When this occurs, a second CATCODE and O-suffix will be assigned reflecting the new functionality. Assigning a secondary CATCODE (i.e., related to objects used for military purposes by terrorists or insurgents) would not remove the initial No-Strike CATCODE from

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the associated facility record in MIDB, but would reside in conjunction with the No-Strike CATCODE. As long as this alternate “hostile” CATCODE assignment was in effect, the combatant command would have the option of attacking the entity.

c. Before strikes can be approved and executed, the combatant command must remove the No-Strike CATCODE and entity identification number from the NSL and place the entity identification number with the appropriate secondary “hostile” CATCODE 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 combatant command, JS/J-2T, and the appropriate RACs will help minimize confusion. Combatant commands must document changes to the NSL by DTG and reason for the change.

d. Exceptions to guidance in paragraph c are those instances where (1) intelligence confirms the use of the No-Strike entity for hostile purposes and the need to strike is time sensitive (whereupon it is nominated as a time sensitive target (TST)), and/or (2) troops are in contact and taking hostile fire from traditional No-Strike entities. These entities do not have to be reflected on the JTL before they can be engaged; operational imperatives, established ROE, including the inherent right and obligation of self-defense, provide the combatant command the appropriate authority to engage in these instances unless this authority is expressly limited in SecDef provided supplemental ROE.

e. From the time a No-Strike entity is characterized as hostile, 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 a No-Strike entity shows no indication of reverting back to its primary function after 12 months, commands should work with the RACs to deactivate the primary CATCODE. Deactivated, No-Strike related CATCODEs should be removed from the NSL but kept under review by the RAC IAW DIAP guidelines and established MIDB business rules.

f. For those combatant commands that do not have responsible producer (RESPROD) authority to assign insurgent CATCODEs and for all other categories of activities other than insurgency or terrorism, the combatant command must coordinate with the national RAC to effect a change in status per established NOM-DCR procedures. To facilitate change of status and re-characterization of No-Strike entities, the combatant command must develop procedures to coordinate with national RACs to codify and institutionalize the process. If the need to prosecute becomes time-sensitive, coordination timeliness compress. Procedures will include the ability to coordinate and

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expedite re-characterization of TST 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 combatant command-specified timeframes.

ENCLOSURE D

JOINT METHODOLOGY FOR CDE

1. Introduction

a. The LOW requires reasonable precautions to ensure only legitimate military objects are targeted. The LOW requires combatants to refrain from intentionally targeting civilian or noncombatant populations or facilities. The LOW also 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 the expected military advantage to be gained.

b. Failure to observe these obligations could result in disproportionate negative effects on civilians and noncombatants and be considered a LOW violation. Furthermore, U.S. leadership and military 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. The U.S. military must emulate and represent these values through the conscientious use of force in the accomplishment of assigned military missions.

c. The CDM encompasses the joint standards, methods, techniques, and processes for a commander to conduct CDE 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 assessing proportionality within the framework of the military decision-making process. In short, the CDM is a means for a commander to adhere to the LOW.

d. The CDM is a balance of science and art that produces the best judgment of potential damage to collateral concerns. As a science, the CDM uses a mix of empirical data, probability, historical observations, and complex modeling for CDE assessments. However, the science is inherently limited by the quantity and reliability of collected and analyzed weapons effects data and target information. Furthermore, the science of the CDM cannot always account for the dynamics of the operational environment. Therefore, the art of the CDM is not only complementary but critical. Targeting professionals, intelligence analysts, and operations personnel should employ their combined expertise, experience, and current intelligence to tailor the science to the

specifics of the operational environment. 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 achieved against a given target warrant the use of kinetic (lethal) weapons.

2. General Guidance

a. The CDM supports employment of conventional munitions across the spectrum of conflict. It provides commanders with an understanding of weapon effects, incidental consequences, and mitigation techniques, enabling more balanced, comprehensive judgments.

b. The CDM is not an exact science. The supporting technical data and processes of the methodology are derived from physics-based computer models, weapons test data, and operational combat observations. All of these sources contain some degree of inherent error and uncertainty. **The CDM does not predict the actual outcome of weapon employment. The operational environment, weapon's reliability, and fidelity of intelligence data are primary factors that account for a CDE output differing from actual combat employment.** Though the CDM follows a rigid process and generates estimated values, neither analysts or commanders should be under the impression that these values in any way constitute ground truth, an exact science, or flawless data. CDM is merely an estimate to assist a commander in the decision making process relying on informed data and sound judgment.

c. Moreover, the CDM and the products derived from the CDM 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 other 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 cannot be an overriding issue depending on the operational environment 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 the CDM.

d. Operation-specific ROE and other policy guidance issued by the Secretary of Defense and/or the President will dictate decision authorities and collateral damage thresholds. Thresholds are established consistent with the LOW, governing reporting requirements, and the delegated CDE responsibilities of strategic, operational, and tactical commanders.

e. 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 operational environment, scalable for tactical through strategic application, and common enough for most geographic areas or regions of conflict.

f. 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) Collateral damage mitigation techniques not expressly authorized in this directive cannot be presented exclusively as part of a CDE assessment. At a minimum, every CDE assessment must use those mitigation techniques authorized in the CJCSI using the CER values and resulting collateral hazard areas (CHAs) derived from the supporting CDE reference tables.

(2) A commander (or the strike approval authority) 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 reference j.

g. Commanders apply the methodology, concepts, and outputs for planning fires below the operational 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) However, the CDM is not intended to deny a commander the ability to respond to time-sensitive targeting events and should not be used as the sole justification to impede or delay fires for time-sensitive targeting.

(2) Additionally, 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 in 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. The concept of proportionality in self-defense is not to be confused with attempts to minimize collateral damage and the other tenets of LOW during military operations.

h. The CDM establishes a means of accommodating policy or other limitations, such as foreign partner sensitivities, 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. Lastly, this instruction directly supports the STAR process which outlines the procedures for CCDRs to identify and classify targets as “sensitive.” CCDRs classify targets as “sensitive” when the potential for damaging effects and/or injury to civilian or noncombatant property and persons and 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 glossary for sensitive target and reference d).

3. Limitations and Exclusions

a. **The CDM accounts for all conventional munitions currently in the U.S. inventory except as noted below and in the accompanying tables.** It is not applicable to nuclear, non-kinetic, or non-lethal capabilities. In future updates, the CDM will account for (or provide references for) them. Until then, follow combatant command/SecDef guidance for targeting with these capabilities.

b. **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, 25mm Bushmaster, M-2 .50 Caliber Machinegun), **rotary wing or fixed-wing air-to-surface direct fire weapon systems less than 105mm** (e.g., 2.75in rockets, M2A1 40mm Bofors, GAU-8 30mm Gatling gun, and GAU-4 20mm Gatling gun) **due to operational practicality.** 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 proportionality, necessity, and reasonableness are considered for employment of direct fire weapon systems.

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

d. **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 noncombatant entities whose presence in the target area cannot be predicted to reasonable certainty within the capabilities and limitations of intelligence collection means. It is an inherent responsibility for commanders,

at all levels, to employ due diligence to identify assemblies of civilian or noncombatant personnel and/or property in the target area and de-conflict target engagements when possible.

e. **The CDM does not account for individual marking or adjusting rounds when employing surface-to-surface ballistic munitions (SSBM) in the Observer Adjusted (OA) method of engagement.** Commanders should remain cognizant of this fact and only employ the minimum number of marking or adjusting rounds required to achieve the desired effects on the target.

f. **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. **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. 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 of flat terrain, rolling hills, and soft soil as the base environment and terrain. 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 assessment from the CDM.

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APPENDIX A TO ENCLOSURE D

THE CDM PROCESS

1. CDM Overview

a. 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 reasonable precautions to minimize effects of combat on the civilian or noncombatant population. The supporting technical data, mitigation techniques, and logic of the CDM recognize the intelligence 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. The CDM is Simple and Repeatable. The steps outlined in Appendix B 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 aide of an automated CDE tool.

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

(1) Beyond the first level, the CDM assigns sub-groupings: A for precision-guided munitions (PGM); B for Air-to-Surface Unguided Munitions (ASUGM); C for SSBM.

(2) At each CDE level an assessment of either low or high is produced. If collateral concerns are not within the computed collateral hazard area (CHA) or if the specified level of risk to collateral concerns is not met, the assessment is low and a higher CDE level is not needed. If a low assessment is rendered the methodology supports engagement of the desired target with the conditions and restrictions specified by the CDE level where the low assessment was estimated. If collateral concerns are within the CHA or the specified level of risk to collateral concerns is exceeded, the assessment is high and the next CDE level is performed.

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d. Risk and the CDM. **The CDM measures the dynamic relationship between three principle 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 risk to forces. As the CDM progresses up through each CDE level, the number of weaponeering restrictions also increases, elevating the potential risk to friendly forces and mission accomplishment based on weapon, platform availability, and threats in the target area. Figure D-A-1 depicts the risk continuum and the interaction between collateral damage and weaponeering restrictions for each CDE level.

e. Collateral Damage Thresholds. The outputs of the CDM provide commanders with easily recognizable measures of operational risk based on the CDE level required to achieve a final CDE assessment. The collateral damage threshold in CDE Levels 1, 2, and 3 mitigates risk to less than 10-percent probability of serious/lethal wounds to standing personnel, dressed in summer weight clothing, in open rolling terrain from primary warhead fragmentation or debris. The collateral damage threshold in CDE Level 4 reduces this risk mitigation to less than 1-percent fractional structural damage to collateral structures from primary warhead blast effects. This is because 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.

COLLATERAL RISK

- CDE 1: TARGET VALIDATION/INITIAL ASSESSMENT
- CDE 2: GENERAL/TARGET SIZE ASSESSMENT
- CDE 3: WEAPONEERING ASSESSMENT
- CDE 4: REFINED ASSESSMENT
- CDE 5: CASUALTY ASSESSMENT

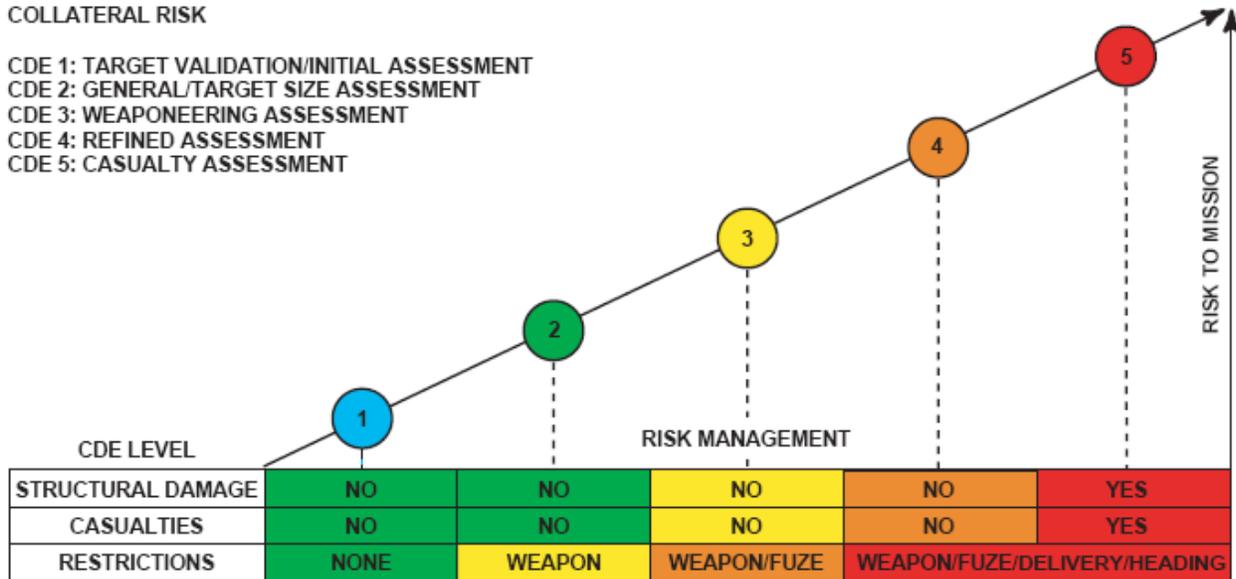


Figure D-A-1. Risk and the Collateral Damage Estimation Methodology

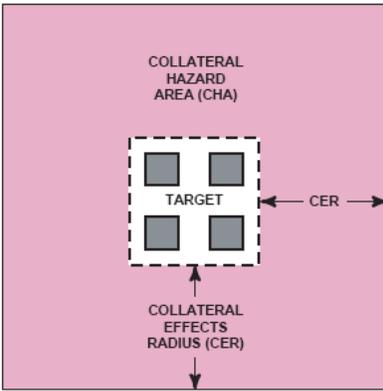
f. Components of the CDE Levels. CER and CHA are two fundamental elements of the CDM that determine the progression from each CDE level.

(1) CER. A CER is 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. 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.

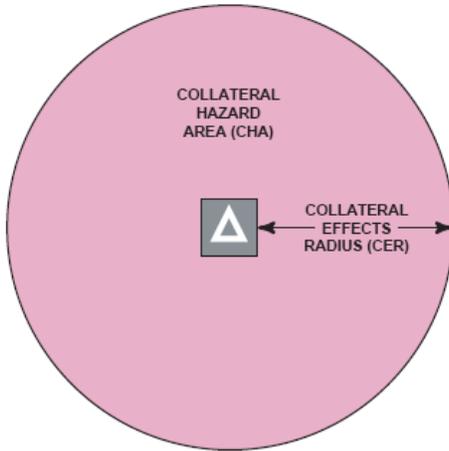
(2) CHA. A CHA is formed by measuring a CER from either the edge of a target facility boundary, the aimpoint for a point target, or the edge of an engagement zone or artillery sheaf for an area target.

(3) Essentially, the CER is used to form the CHA. The assessment conducted at each CDE level is based on the existence of collateral concerns within the corresponding CHA. Within a CHA there is an unacceptable probability for damage or injury to collateral concerns, which include persons and objects. Each succeeding CDE level employs mitigation techniques and weaponeering restrictions designed to reduce the area of collateral effects to an acceptable level. Figure D-A-2 illustrates the CER/CHA relationship.

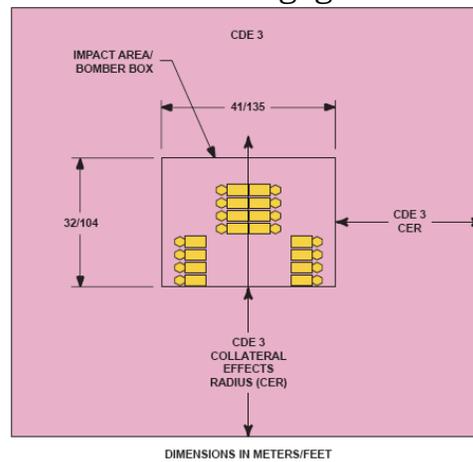
CHA measured from a installation/facility/target boundary:



CHA measured from an aimpoint:



CHA for ASUGM Engagement Zone:



CHA measured from SSBM sheaves:

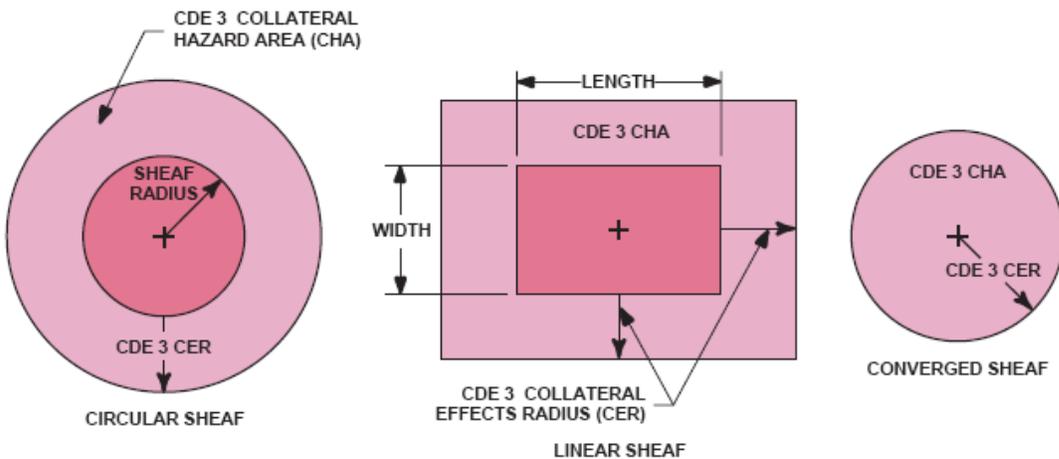


Figure D-A-2. CER and CHA Relationships

g. Warhead Effects in the CDM. The maximum distance to achieve probability of damage and injury was developed for each warhead contained in the CDE reference tables. These include considerations for primary blast, fragmentation, secondary debris from crater ejecta, and blunt trauma from building collapse using damage criteria appropriate for each CDE level.

h. Types of Error Used in the CDM. The CDM and supporting CDE reference tables involve three primary categories of error: delivery error, target location error, and total error.

(1) Delivery error is expressed in terms of circular error. 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) Target location error (TLE), also expressed in terms of circular error, is the error associated with locating the true position of the target. Specifically, TLE90 describes the radius of a circle in the ground plane centered on the target coordinates such that 90 percent of the time the true target location is within.

(3) Total error 90 (TE90), expressed in terms of CE90, is the root sum square (RSS) of the delivery error and the TLE90. The CDM and supporting CDE reference tables apply two distinct TE90 values, Precision TE90 and OA TE90. The two TE90 values are calculated using separate TLE90 measurements and are based on the specific weapon classes and methods of engagement.

(a) Precision TE90. Precision TE90 is used to calculate precision PGM, ASUGM, and SSBM CER values for the Precise Method of Engagement delineated in the CDM. The Precision TE90 is determined using the accepted errors for precise target coordinates.

(b) OA TE90. OA TE90 is used to calculate SSBM CER values for the OA method of engagement specified in the CDM. OA TE90 is based on observed operational accuracies and tactics, techniques, and procedures.

i. Cluster and ICM Pattern Radius. Worst-case pattern radii have been developed for each weapon, capable of dispensing sub-munitions, contained in the CER reference tables. The worst-case radii are combined with individual sub-munition collateral effects radii and TE90 to produce CER values appropriate for each CDE level.

j. CDE Reference Tables. To support CDE, JTCG/ME accredits and produces CER and Minimum Target Size (MTS) reference tables twice annually (at a minimum). JTCG/ME maintains the tables on their SIPRNET Web page

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(<https://jtcg.amsaa.army.smil.mil/jpias/index.html>). Request access via the site as the tables are password protected. When new tables are developed JS/J-2T 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 United States should contact their local U.S. DOD representative.

(1) CER reference tables are tailored for each CDE level, considering collateral concern, the weaponeering capabilities, and limitations of each munition addressed in the tables. The tables represent the range of collateral weapon effects, measured from a warhead detonation, for each conventional munition in the US inventory. CER reference table values are rounded up to allow for simplicity of operational use and a conservative assessment.

(2) Below is a list of the tables and the CDE level they support as posted on the JTCG/ME Web site:

CDE Level 1: Target Validation/Initial Assessment
- CDE Level 1 CER Reference Table

CDE Level 2: PGM General Assessment
- CDE Level 2A PGM CER Reference Table

CDE Level 2: ASUGM/SSBM Minimum Target Size Assessment
- CDE Level 2B ASUGM Minimum Target Size Reference Table
- CDE Level 2C SSBM Minimum Target Size Reference Table

CDE Level 3: Weaponeering Assessment
- 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 Assessment
- CDE Level 4A PGM CER Reference Table
- CDE Level 4B ASUGM CER Reference Table
- CDE Level 4C SSBM CER Reference Table

(3) Appendix C to this Enclosure summarizes the intended use for each reference table, the dominant hazard used in calculating the CER, the threshold criteria, and any assumed exclusions or limitations.

2. The Five Basic Questions of the CDM

a. Introduction. In its most basic form, the CDM centers on five

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simple questions that must be answered before engaging any target.

(1) **Can I PID the object I want to affect?** (PID: defined as “the reasonable certainty that a functionally and geospatially defined object of attack is a legitimate military target in accordance with the LOW and applicable ROE.”) Note: Recent operational feedback indicate that most collateral damage incidents result from target misidentification.

(2) **Are there protected or collateral objects, civilian or noncombatant personnel, involuntary human shields, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target?**

(3) **Can I mitigate damage to those collateral concerns by attacking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?**

(4) **If not, how many civilians and noncombatants do I think will be injured or killed by the attack?**

(5) **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?**

b. **CDE Level 1 Target Validation/Initial Assessment Overview.** 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 assessment answers the first two questions: “Can I PID the object I want to affect” and “Are there protected or collateral objects, civilian or noncombatant personnel, involuntary human shields, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target”. CDE Level 1 evaluates the target’s functionality for dual-use concerns, identifies potential CBR plume hazards, environmental hazards, and identifies all collateral concerns within the CDE Level 1 CER (resultant CHA). This step reveals those targets or collateral concerns that may represent areas of strategic risk and therefore may also have to be evaluated via the STAR process (see reference d).

(1) CDE Level 1 is supported technically 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 conventional weapon in the US inventory (with exceptions noted in the table). 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 boundary drawn around the entity being targeted. This entity

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could be an installation, a facility, or an area target. The resultant CHA becomes the primary search area for the identification of collateral concerns near a target. Targets assessed as CDE Level 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 assessed as CDE Level 1 High present a greater probability of collateral damage and require a CDE Level 2 assessment.

(2) Target Development. The CDE Level 1 assessment begins with characterizing the target's functionality/purpose, physical orientation and description, and the identity of the intended target by geospatially distinguishing the target from its surrounding environment. This is normally accomplished through imagery analysis; however, if imagery is not available commanders should use the best resources available to geospatially separate the combatant function of the target from its civilian and noncombatant surroundings. The next step is to identify and characterize the target's critical elements. This step identifies those elements whose engagement supports attainment of the commander's objectives and avoids targeting those LOW protected or collateral objects sometimes located on combatant installations and facilities. The final step in target development is to confirm that current ROE authorizes the target for engagement.

(3) Dual-Use Target Assessment. Following target validation, determine if the target serves a combatant and a civilian/noncombatant purpose. Enclosure B provides definitions and treatment of dual-use targets. If the target is characterized as dual-use then initiate intelligence analysis to estimate the population density of the facility. Information is required as all dual-use targets require a CDE Level 5 assessment.

(4) Protected or Collateral Object and Human Shield Assessment. Once positive identification is established, define the CDE Level 1 CHA around the target based on the values contained in the CDE Level 1 CER Reference Table. This step is normally performed through annotations on imagery; however, in cases where imagery is not available, use the best resources available, such as maps and charts. Once the CDE Level 1 CHA is established, 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). Imagery used to support CDE assessments will not be older than 90 days. This is waived to 180 days if there are no indications of change in the area of interest.

(a) Human Shields. **The U.S. LOW delineates between voluntary and involuntary human shields.** Human shields are civilian or noncombatants placed around a valid military target by a combatant to hinder

attack of that target. Voluntary human shields (i.e., civilians who voluntarily and intentionally place themselves in the line of fire so as to disrupt that line of fire) are considered to have shed their protected status and are instead direct participants in hostilities. In other instances, the belligerent nation may forcibly place civilians or noncombatants at valid military targets and these personnel are considered protected persons and should not be targeted (involuntary human shields). Therefore, **only involuntary human shields are considered collateral objects in the CDM.**

1. In cases where intelligence indicates the enemy is using involuntary 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 involuntary human shields during CDE Level 5 casualty assessment.

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

(5) CBR Plume Hazard Assessment. 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 facility or one of the surrounding collateral objects. Examples of CBR plume hazards include 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. **The presence of a CBR plume hazard (target or collateral object) may elevate the target to the STAR process even if the CDE is assessed as low due to environmental risks or the risk of expanding the effects of the conflict (see reference d).**

(a) If the target facility is assessed as a plume hazard, weaponize the target to achieve the desired effects and submit the target along with the weaponizing solution through the combatant command to DTRA for a Hazard Prediction Assessment Capability (HPAC) analysis. Add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate. **In almost all cases, plume-producing targets are assessed as CDE Level 5 High due to the likelihood of significant casualties.**

(b) If the plume hazard is not the target, but a plume producing collateral object located within the CDE Level 1 CHA, continue with the CDE assessment to mitigate the potential weapon effects on the plume hazard. If unable to mitigate the weapon effects, submit the plume hazard along with the

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weaponeering solution through the combatant command to DTRA for HPAC analysis. Add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate.

(c) If the two cases above do not apply, commanders must still be informed of the risk of errantly engaging a CBR plume hazard. Therefore, the CDE analyst must still submit the collateral concern plume hazard for HPAC analysis. In this instance, submit the weaponeering solution as in the above two cases but clarify that the selected weapon misses the intended target and impacts the collateral concern plume hazard. Include the HPAC analysis and casualty estimate as a note to the final CDE assessment to provide the combatant command commander with a complete picture of the risks associated with engaging the intended target. However, do not add the HPAC casualty estimate to the overall CDE Level 5 casualty estimate.

(6) Environmental Damage Assessment. The final evaluation of hazards within CDE Level 1 identifies those objects whose engagement could produce widespread, long-term, and/or severe damage to the civilian or noncombatant population and/or the environment, including flooding, uncontrollable fire, and distribution or spillage of hazardous waste. **In almost all cases, environmentally damaging targets are assessed as CDE Level 5 high due to the likelihood of significant casualties. In addition, the presence of an environmental hazard (target or collateral object) may elevate the target to the STAR process even if the CDE is assessed as low due to the environmental risks and expanding the effects of the conflict (see reference d).**

(a) If the target has the potential of causing an environmental hazard, weaponeer the target to achieve the desired effect and provide the weaponeering solution through the combatant command to NCMI for environmental hazard analysis via Chemical Hazard Area Modeling Program (CHAMP). Include CHAMP data in the final CDE assessment, and add any estimated casualties to the overall CDE Level 5 casualty estimate.

(b) If the intended target does not present any environmental concerns, but there is an identified environmental hazard within the CDE Level 1 CHA, continue with the CDE assessment to mitigate the potential weapon's effects on the environmental hazard. If unable to mitigate the weapon's effects, submit the environmental hazard along with the weaponeering solution to NCMI for CHAMP analysis. Add CHAMP data to the overall CDE Level 5 casualty estimate.

(c) If the two cases above do not apply, commanders must still be informed of the risk of errantly engaging an environmental hazard. Therefore, the CDE analyst must still submit the collateral concern environmental hazard

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to NCMI for CHAMP analysis. In this instance, submit the weaponeering solution as in the above two cases but clarify that the selected weapon misses the intended target and impacts the collateral concern environmental hazard. Include the CHAMP data as a note to the final CDE assessment to provide the combatant command commander with a complete picture of the risks associated with engaging the intended target. However, in this case, do not add NCMI's CHAMP data to the overall CDE Level 5 casualty estimate.

(7) CDE Level 1 Evaluation

(a) PID/ROE/Defined Facility Boundary Evaluation. Can I PID the object I want to affect? (PID: defined as “the reasonable certainty that a functionally and geospatially defined object of attack is a legitimate military target in accordance with the LOW and applicable ROE.”)

1. If yes, continue with the CDE Level 1 assessment.
2. If no, stop. Target must be PID before continuing.

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

1. If the answer to either of these cases is yes, the target is dual-use and assessed as “CDE Level 1 high.” Dual-use targets require a CDE Level 5 casualty estimation where all of the personnel within the target facility are characterized as civilian or noncombatant casualties.
2. If the answer is no, then the target is not considered dual-use and the CDE Level 1 assessment is continued.

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

1. If the answer is yes, then the target is assessed as CDE Level 1 high, and the CDE Level 1 assessment is continued.
2. If no, the target is eligible for engagement with any conventional weapon in the US inventory with exceptions as noted in the CDE Level 1 CER Reference Table. Continue with the CDE Level 1 assessment.

(d) CBR Plume Hazard Evaluation. “Does the target present a CBR plume hazard?”

1. If yes, the target is assessed as CDE Level 1 high and requires HPAC analysis and a CDE Level 5 casualty estimate.

2. If no, continue with the CDE Level 1 assessment.

(e) Environmental Damage Evaluation. “Would engagement of this target cause widespread, long-term, and/or severe damage to the civilian or noncombatant population and/or the environment?”

1. If yes, the target is assessed as CDE Level 1 high and requires an environmental hazard CHAMP assessment and a CDE Level 5 casualty estimate.

2. If no, continue with the CDE Level 1 assessment.

(f) CDE Level 1 Final Evaluation. If the target is PID'd; is not characterized as a dual-use facility; does not present either a CBR plume or environmental hazard; and there are no collateral objects and/or involuntary human shields within the CDE Level 1 CHA, the target is assessed as CDE Level 1 Low and may be cleared for engagement with every conventional weapon in the U.S. inventory with exceptions as noted in the CDE Level 1 CER Reference Table. If any of these conditions are not satisfied, the target is assessed as CDE Level 1 High and requires continued evaluation (PID, ROE, DTRA, NCMI, casualty estimate). Ensure PID and ROE issues are resolved prior to continuing to CDE Level 2. **In addition, if the assessment requires a Level 5 Casualty Estimate (CE), ensure this is accomplished even if weapons effects are mitigated to a low assessment. As a result of these special circumstances, the target may also be subject to review via the STAR process (see reference d).**

c. **CDE Level 2 General and Target Size Assessment Overview.** CDE Level 2 begins the process of defining weaponeering options that both achieve the desired target effect and mitigate the potential for collateral damage. This step addresses the third question of the CDM, “Can I mitigate damage to those collateral concerns by attacking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?” CDE Level 2 takes a low risk approach to CDE with the least number of weaponeering and tactical employment restrictions. CDE analysts must use the weaponeering data given to them in the target folder or by the weaponeer. If the CDE analyst cannot achieve a desirable CDE assessment with the weaponeering solution presented they 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 the CDE assessment does not change the intended effects on the target. Two distinct

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assessments are employed within CDE Level 2 to guide weapon class selection (Minimum Target Size Assessment and PGM General Assessment).

(1) The **Minimum Target Size Assessment** evaluates the target engagement with ASUGM or SSBM based on a comparison of the target's size to the weapon system's or delivery platform's delivery error. The Minimum Target Size Assessment is technically supported by the CDE Level 2B ASUGM Minimum Target Size Reference Table and the CDE Level 2C SSBM Minimum Target Size Reference Table. The **PGM General Assessment** evaluates target engagement with PGMs on individual aimpoints while minimizing the weaponing restrictions to either unitary or cluster PGMs. The General Assessment is technically supported by the CDE Level 2A PGM CER Reference Tables.

(a) The **Minimum Target Size Assessment** provides a simple means to determine the feasibility of engaging a target with unguided or ballistic weapons. This assessment is accomplished through the comparison of target area to weapon system/delivery platform TE90. The Minimum Target Size Assessment is based on the principle that weapon systems/delivery platforms with a TE90 less than or equal to the target area have a higher probability of achieving the desired target effect while reducing the risks of collateral damage. The inverse case significantly reduces the probability of achieving the desired target effect while greatly increasing the risks of collateral damage. To accomplish this assessment, CDE Level 2 is broken down into two separate CER Reference Tables: CDE Level 2B for ASUGM and CDE Level 2C for SSBM.

1. CDE Level 2B ASUGM Minimum Target Size Reference Table.
The CDE Level 2B Reference Table defines delivery platform specific minimum target sizes for evaluating ASUGM employment against a given target. The minimum target sizes in the table represent either the diameter of a circle or the length of one side of a square based on each delivery platform's specific mean TE90. ASUGM mean TE90 equals the average TE90 for each of the listed delivery platforms. In practical terms, the minimum target size, if taken to form a square, represents the area on the ground within which a single unguided weapon would impact with a 90 percent probability if delivered from the associated platform. Targets evaluated using the data contained in the CDE Level 2B CER Reference Table are not assessed as high or low since no warhead selection has been made. They are considered only for feasibility of engagement by the listed delivery platforms.

2. CDE Level 2C SSBM Minimum Target Size Reference Table.
The CDE Level 2C Reference Table defines weapon system specific minimum target sizes for evaluating the feasibility of SSBM employment against a given target considering the target's size. The minimum target sizes represent either

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the diameter of a circle or the length of one side of a square based on the weapon system's mean OA TE90. In practical terms, the minimum target size, if taken to form a square, represents the area on the ground within which a single SSBM warhead would impact to a 90 percent probability if fired from the associated weapon system. Targets evaluated using the data contained in the CDE Level 2C Reference Table are not assessed as high or low since no shell/fuze selection has been made. They are considered only for feasibility of engagement by the listed weapon systems.

(b) CDE Level 2 ASUGM/SSBM Minimum Target Size Assessment.

Large area targets may be engaged with ASUGMs or SSBMs based on the most efficient use of ordnance required to achieve the desired effect or when available weaponeering options are limited due to the tactical situation. Since ASUGMs and SSBMs incur a significantly greater delivery error than PGMs, target size is a major consideration. Additionally, the increased delivery errors associated with ASUGMs and SSBMs present higher risks of collateral damage than PGMs. **Therefore, the CDM does not support a CDE Level 2 Low assessment for these weapons and requires at least a CDE Level 3 assessment.** This requirement for at least a CDE Level 3 assessment provides the commander with a clear indication of the elevated risk of ASUGM or SSBM employment. The following procedures provide a rapid means to determine the suitability and rationality of employing unguided/ballistic munitions and the selection of appropriate delivery platforms and/or weapon systems.

1. Step 1. Review the target information produced in CDE Level 1 to identify protected or collateral objects located within the installation, facility boundary, or target area (bounded area not restricted to a facility). Protected or collateral objects located within the boundaries of a valid military target are not authorized for attack unless there is clear evidence that the adversary is using them to support the war effort and the adversary has been warned to stop doing so and has not heeded the warning. For instance, a chapel has been converted into a command and control facility, or a hospital is being used to store weapons. If clear evidence of LOW violations is not available, collateral objects retain their protected status.

2. Step 2. Determine and record the smallest side or diameter of the target, using one of the following methods (refer to Figure D-A-3).

a. Rectangular Target Method. Measure the length and width of the target facility boundary and record the smaller value. This is the shortest side or diameter of the target facility.

b. Circle Method. Review and select the geographic center point of the target facility boundary. Measure and record the distance from the

center point to the nearest facility boundary and multiply that distance by a factor of two, producing the shortest facility diameter.

c. Segment Method. Review and divide the target into logical rectangular segments based on the weaponeering options available. Measure and record the smaller of the length and width of each rectangular target segment and evaluate each segment individually in the following step.

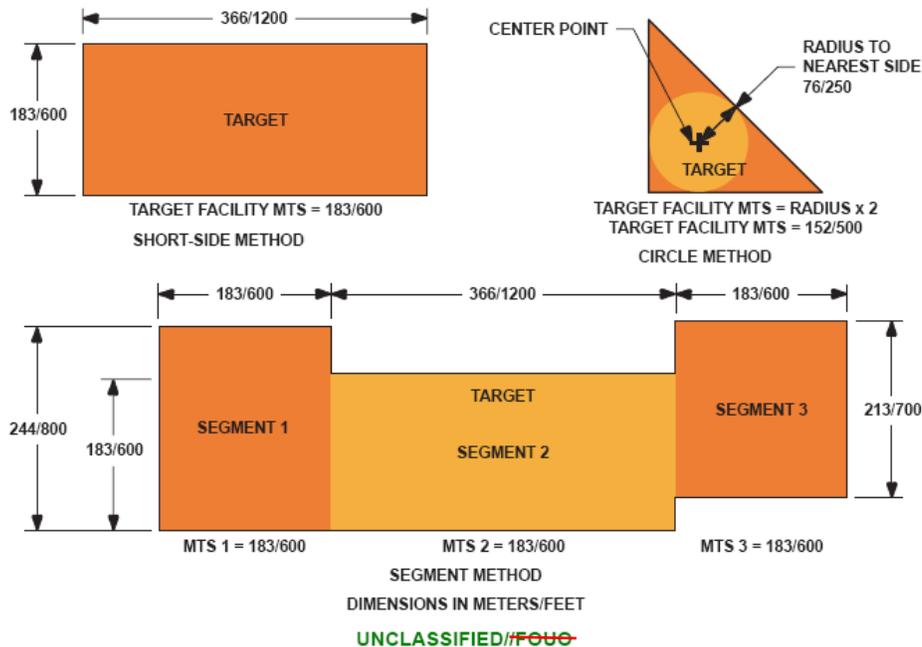


Figure D-A-3. Minimum Target Size Methods

3. Step 3. Compare the target measurements derived in Step 2 with the delivery platform and weapon system specific minimum target size values contained in the CDE Level 2B ASUGM and/or CDE Level 2C SSBM Minimum Target Size Reference Tables.

(c) CDE Level 2 ASUGM/SSBM Minimum Target Size Evaluation

1. If the delivery platform/weapon system minimum target size value is less than or equal to the recorded target or segment short side/diameter value, the delivery platform/weapon system is assessed as feasible for employment to engage the target. Continue to CDE Level 3 and perform a CDE assessment considering the specific delivery system, weapon(s), and tactics required to achieve the desired target effect. CDE Level 2 is not a final step in the CDM for ASUGMs and SSBMs. A CDE Level 3 assessment is required.

2. If the delivery platform/weapon system minimum target size value is greater than the recorded target or segment short side/diameter value, the delivery platform/weapon system is assessed as unfeasible for employment to engage the target. **In this case, serious consideration must be given to engaging the target only with PGMs.** If PGM employment options are not available within the timeframe required to engage the target, continue to CDE Level 3 and perform a CDE assessment considering the specific delivery system, weapon(s), and tactics to be employed. **A decision to continue presents increased risk of collateral damage.**

(2) The **PGM General Assessment** evaluates the risk of collateral damage by employing either a unitary or cluster PGM without having to select a specific unitary or cluster warhead. The CDE Level 2A CER Reference Table supports the PGM General Assessment.

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

(b) The PGM Unitary values in the reference table combine the radius of collateral effects from the precision warhead with a TE90 value. The PGM Cluster values in the reference table combine the radius of collateral effects from the warhead, Precision TE90 and the sub-munition pattern radius.

(c) Targets assessed as CDE Level 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.

(d) CDE Level 2 PGM General Assessment. Point targets and targets that present close-in collateral concerns are best serviced by PGMs. The CDE Level 2 PGM General Assessment is a means to assess risk of collateral damage while enabling maximum tactical flexibility, limiting the restrictions on target engagement to either Unitary or Cluster PGMs. There are two methods to perform the General Assessment. The **Aimpoint Method** assesses the risk of collateral damage with engaging each individual aimpoint. This method provides a CDE Level 2 Low assessment for those aimpoints with no collateral concerns within the CHA generated from the appropriate CDE Level 2 CER Reference Table value. The **Facility Method** assesses the risk of collateral damage for all aimpoints within a given target facility simultaneously by applying the appropriate CDE Level 2 CER Reference Table value measured from the target facility boundary. The Aimpoint Method is the preferred

technique for assessing potential collateral damage since the CDE Level 2 CER Reference Table value is measured from individual aimpoints.

1. Aimpoint Method. Using the aimpoint graphics produced in CDE Level 1, 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. Target type will dictate whether a unitary or cluster weapon is appropriate.

2. Facility Method. Using the facility outline graphic from CDE Level 1, 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 boundary and visually search for collateral objects located within the CHA. Target type will dictate the most appropriate weapon to employ. If any collateral objects are identified using this method, stop and use the aimpoint method to perform the PGM General Assessment. An example of an appropriate use of the facility method is in the target development phase of the Joint Targeting Cycle wherein the actual desired points of impact are not known.

(e) CDE Level 2 PGM General Evaluation

1. If no collateral objects are located within the CHA, a CDE Level 2 Low (PGM Unitary (or Cluster)) assessment is made for the aimpoint or target facility (depending on the method used). Targets determined to be CDE Level 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.

2. If collateral objects are identified within the CHA, a CDE Level 2 High assessment is made for the aimpoint or target facility (depending on the method used). A CDE Level 3 assessment then is required.

Note: CDE assessments for PGMs are required for each aimpoint within the target facility. The overall target facility CDE assessment equals the highest or most restrictive aimpoint CDE assessment. For example, a target facility has three aimpoints. One aimpoint is assessed as CDE Level 2 Low; a second aimpoint is assessed as CDE Level 3 Low; and the third aimpoint is assessed as CDE Level 4 Low. The target's overall CDE assessment is CDE Level 4 Low.

d. **CDE Level 3 Weaponering Assessment Overview.** CDE Level 3 begins the process of refining weaponering options that both achieve the desired effect on the target and mitigate collateral damage, thereby addressing

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the third question in the CDM process, “Can I mitigate damage to those collateral concerns by attacking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?” The goal of CDE Level 3 is to achieve a low CDE assessment while limiting the number of tactical weaponeering 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 achieving the desired effect on the target. There are three tables that support a CDE Level 3 assessment and are defined below.

(1) CDE Level 3A PGM CER Reference Table. The CDE Level 3A CER Reference Table provides two columns of individual warhead CERs, measured from an aimpoint, to define a CHA. The table lists warheads by type: air-to-surface unitary, air-to-surface cluster, and surface-to-surface unitary. The tables are arranged from larger to smaller CER value, enabling the rapid selection of alternate warheads in cases where the warhead restriction in the CDE assessment is not available at the point of execution. 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 to standing unprotected personnel. Only warheads capable of delay fuzing to achieve complete burial below grade prior to detonation are provided CER values in the Mitigated column.

(a) CDE Level 3A PGM Unmitigated CERs. The dominant hazard for the Unmitigated column is from fragmentation to standing, unprotected personnel, dressed in a summer-weight uniform on open rolling terrain for a warhead fused for either a surface or air detonation. 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 assessed as CDE Level 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) CDE Level 3A PGM Mitigated CERs. The Mitigated column numbers in the reference table combine the radius of collateral 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 assessed as CDE Level 3 Low (PGM with a Mitigated CER) present a low probability of

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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) CDE Level 3B ASUGM CER Reference Table. The numbers in the CDE Level 3B CER Reference Table combine the mean Precision TE90 associated with individual delivery platforms, such as F-18, B-52, and F-16, 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 for single warhead deliveries or from the edge of one or more engagement zones (EZs) for multiple warhead deliveries to form the CHA. Targets assessed as CDE Level 3 Low ASUGM present a low probability of collateral damage, but, are tactically restricted to a specific delivery platform and warhead and 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 restriction is required with CDE Level 3 for multi-warhead deliveries. This restriction further elevates the risk to mission.

(3) CDE Level 3C SSBM 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 OA or Predicted methods of engagement 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 assessment. Targets assessed as CDE Level 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 assessed as CDE Level 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.

(4) CDE Level 3 Weaponing Assessment

(a) CDE Level 3 PGM Weaponing Assessment

1. Step 1. Measure and record the distance from each aimpoint to the corresponding nearest collateral concern identified in CDE Level 1.

2. Step 2. Review the CDE Level 1 target information and

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weaponer each aimpoint with the appropriate PGM warhead and fuze option to achieve the desired effect on the target.

3. Step 3. Select the appropriate CER value from the CDE Level 3A PGM CER Reference Table corresponding to either an unmitigated or mitigated weaponer decision.

4. Step 4. Compare the CDE Level 3A PGM CER with the distance to the nearest collateral concern derived in Step 1.

5. CDE Level 3 PGM Weaponer Assessment Evaluation

a. If the CDE Level 3 PGM CER for the selected weaponer decision **is less than or equal to** the distance to the nearest collateral concern, the target is assessed as **CDE Level 3 Low PGM, (Warhead (Unmitigated Case))** or **CDE Level 3 Low PGM, (Warhead, Delay Fuze (Mitigated Case))**.

b. If the CDE Level 3 PGM CER for the selected weaponer decision **is greater than** the distance to the nearest collateral concern, the target is assessed as **CDE Level 3 High** and requires a higher level CDE assessment. If mitigation is employed in the CDE Level 3 assessment, continue to CDE Level 4. If mitigation is not employed in the CDE Level 3 assessment, due to the weaponer solution required to achieve the desired target effect, continue directly to CDE Level 5 to estimate the number of civilian and noncombatant casualties.

(b) CDE Level 3 ASUGM Weaponer Assessment

1. Step 1. Using the target information from CDE Level 1 and the delivery platform selection from CDE Level 2, determine an appropriate method of target engagement, either single or multiple warhead delivery. Continue to weaponer the target to achieve the desired effect. If a multiple warhead delivery is required to achieve the desired effect, compute the length and width of the EZ, such as a bomber box or stick.

2. Step 2. If weaponer a point target for single warhead delivery, annotate aimpoints on each of the desired target elements. If weaponer an area target for a multiple warhead delivery, determine a center aimpoint for the target area, then annotate and orient the EZ to achieve the desired target coverage, ensuring the EZ excludes any collateral concerns located on the target facility. Some targets may require more than one EZ to achieve the desired effect. If a precise aimpoint coordinate mensuration

capability or imagery is not available, CIB, and Digital Terrain Elevation Data (DTED) are authorized to perform this step.

3. Step 3. 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 nearest collateral concern(s).

4. Step 4. Select the appropriate CER value from the CDE Level 3B ASUGM CER Reference Table corresponding to the delivery platform and warhead weaponeering decision for each aimpoint and/or EZ developed in Step 2 above. Compare the CER to the distance to the nearest collateral concern.

5. CDE Level 3 ASUGM Weaponeering Assessment Evaluation.

a. If the CER value for the selected weaponeering decision is less than or equal to the distance to the nearest collateral concern, the target is assessed as:

(1) Single Warhead: CDE Level 3 Low (ASUGM, Delivery Platform, Warhead).

(2) Multiple Warhead: CDE Level 3 Low (ASUGM, Delivery Platform, Warhead, Heading Restriction: degrees). Multiple warhead deliveries are restricted to the specific delivery heading oriented to the EZ.

b. If the CER value for the selected weaponeering decision is **greater than** the distance to the nearest collateral concern, the target is assessed as **CDE Level 3 High** and requires a CDE Level 4 assessment.

c. The CDE Level 3B ASUGM CER Reference Table only provides unmitigated CERs.

d. For a CDE Level 3 High assessment, serious consideration should be given to only engaging the target with PGMs. However, if PGMs are not available, continue to CDE Level 4.

(c) CDE Level 3 SSBM Weaponeering Assessment

1. Step 1. Using the CDE Level 1 target information, weapon system selection from CDE Level 2, and method of engagement and sheaf specified for the fire mission, weaponeer the target to achieve the desired effect.

2. Step 2. Select an aimpoint for each sheaf planned for employment against the target. Annotate and orient the sheaf(s) to achieve the

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desired target coverage, ensuring the sheaf(s) exclude any collateral concerns located on the target facility. Some targets may require more than one sheaf to achieve the desired effect.

3. Step 3. 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 nearest collateral concern identified in CDE Level 1 (refer to Figure D-A-2).

4. Step 4. Select the appropriate value from the CDE Level 3C SSBM CER Reference Table corresponding to the weapon system, shell, fuze, and method of engagement decision for each sheaf developed in Step 2 above. Compare the value from the table to the distance to the nearest collateral concern measured in Step 3. The method of engagement in the assessment is based on the method of target acquisition or location and must remain consistent throughout the CDE assessment.

5. CDE Level 3 SSBM Weaponneering Assessment Evaluation

a. If the CER value from the table for the selected weapon system, shell, fuze, and engagement method **is less than or equal to** the distance to the nearest collateral concern, then the target is assessed as **CDE Level 3 Low (SSBM, Caliber, Weapon System, Shell, Fuze, OA [or "P" Predicted])**.

b. If the CER value from the table for the selected weapon system, shell, fuze, and method of engagement **is greater than** the distance to the nearest collateral concern, the target is assessed as **CDE Level 3 High** and requires a CDE Level 4 assessment.

c. **For a CDE Level 3 High assessment, serious consideration should be given to only engaging the target with PGMs.** However, if PGMs are not available, continue to CDE Level 4.

e. **CDE Level 4 Refined Assessment Overview.** CDE Level 4 completes the process of defining weaponneering solutions that achieve 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 concerns by attacking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?" CDE Level 4 is also the point within the methodology where mitigation techniques besides fuzing are applied. **CDE Level 4 is calculated for less than 1-percent probability of fractional structural damage from blast based on the assumption that noncombatant personnel will be located in noncombatant collateral structures which afford some measure of protection from**

fragmentation. 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 noncombatants or civilians in the open that can be predicted based on available intelligence, such as: rush hour traffic, a soccer game, or a parade (as examples). 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 non-structural targets to further mitigate fragmentation effects on unprotected noncombatant personnel. Unprotected personnel located in geospatially defined outdoor collateral concerns 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 CDE assessment while minimizing tactical restrictions.** CDE Level 4 has three supporting CDE reference tables and their specific attributes are provided below with two noted exceptions: **Cluster/ICM Restriction**--the CDM does not support use of cluster weapons and ICMs within CDE Level 4. Therefore, values for cluster weapons and ICMs are not provided within the CDE Level 4 CER Reference Tables; and **SSBM RAP and Extended/Enhanced Range Munitions Restriction**--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) CDE Level 4A PGM CER Reference Table. The CDE Level 4A CER Reference Table provides individual PGM unitary warhead CER values for individual collateral structure types, measured from an aimpoint, to define a CHA. The numbers in the table combine the radius of collateral weapon effects and the Precision 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. In addition, given the propensity for weapons to impact long of the target, a stated delivery heading restriction is required within CDE Level 4 for PGMs. Targets assessed as CDE Level 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, and restricted to a specified delivery heading. Consequently, the risk to mission is elevated. Use of the CDE Level 4A PGM CER Table requires either complete warhead burial in the ground or

complete internal detonation within a target structure to mitigate the fragmentation effects of the warhead.

(a) 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. In particular, the values are not reduced for the mitigating effects of internal or buried detonation in a target structure or for warhead detonation external to the collateral structure.

(b) Nearest, Weakest or Multiple Collateral Concern. The

nearest collateral concern 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 and an analyst can more easily characterize the structure types. However, there will be instances when construction types of nearby collateral structures vary greatly and an analyst may need to consider the weakest and 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 concerns that would not normally be 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 within the current ROE and policies needs to assess 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 the stronger building type were used, a lower casualty estimate may result (less conservative approach). Either way, the analyst needs to be consistent in their technique and note all assumptions used when briefing the commander on the CDE estimate and include them in the target folder (electronic or hardcopy).

(2) CDE Level 4B ASUGM CER Reference Table. The numbers in the CDE Level 4B CER Reference Table combine the mean Precision TE90 associated with each delivery platform and the radius of collateral effects associated with each individual air-to-surface unguided warheads, such as a Mk-82. These table values are measured from an aimpoint for a single warhead or the edge of one or more EZs for multiple warhead deliveries to form the CHA. In addition, given that delivery heading is a significant consideration for EZ orientation and that there is a propensity for weapons to impact long of the target, a stated delivery heading restriction is required within CDE Level 4 for ASUGMs. Targets assessed as CDE Level 4 Low ASUGM present an

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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, specific release parameters, and a specific delivery heading. These constraints further elevate the risk to the mission.

(3) CDE Level 4C SSBM 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 for each weapon system, shell, and fuze combination listed in the table. These values are used to form a CHA measured from either 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 assessment. In addition, the CDE Level 4C table values assume no civilian or noncombatant personnel are exposed in the open. Targets assessed as CDE Level 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. Additionally, targets assessed for SSBMs as CDE Level 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.

(4) 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 concerns. Any additional mitigation techniques will be applied in accordance with the guidance prescribed in this instruction (see Table D-A-1 below).

(a) Delay Fuze/Warhead Burial. Delay fuzing for complete warhead burial prior to detonation is a very effective technique for mitigating warhead 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 and for the PGM and ASUGM tables in CDE Level 4. 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 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. 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) 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 that present a significant delivery error problem. In fuzing for an air detonation, an SSBM will not impact a collateral structure near the target. As a result, there is a reduced risk of penetrating the structure and violating the protection afforded to the civilians and noncombatants inside.

(c) Delivery Heading Restrictions. Restricting the delivery heading of warheads is an effective technique for mitigating the risk of range delivery error. Regardless of delivery method, warheads generally have a tendency to impact long of the intended aimpoint. Additionally, weapon testing has revealed the majority of lethal effects occur in the forward quadrants of warhead detonation along the delivery heading. The lethal effects include both fragmentation and secondary debris from the target. Therefore, delivery heading restrictions are built into CDE Level 4 process for both PGMs and ASUGMs to reduce the risk of warheads impacting nearby collateral concerns and to mitigate the fragmentation and secondary debris effects to collateral objects in the target area. PGMs and ASUGMs capable of terminal delivery heading designations are restricted in CDE Level 4 assessments to those headings that cause the warhead to impact away from and parallel to nearby collateral concerns. Delivery-heading restrictions mitigate two phenomena and effects: the occurrence of dominant lethal effects within the forward quadrants (between 270 and 90 degrees relative to the delivery heading) of warhead detonation and the range error probability that warheads impact long of an aimpoint. Delivery headings should be directed towards areas parallel and away from collateral concerns within 2 CEPs of the weapon used. Delivery-heading restrictions 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 restriction, reweaponeer the target, achieve effects on the target via other means, or abort the mission.

(d) Shielding. Intervening structures, significant vegetation, and, in some very rare cases, terrain may shield collateral concerns 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 capable of shielding a warhead's effects is located between the intended aimpoint and a collateral concern. Since shielding is conditional on the target's presentation in the physical environment, it is not built into any of the CER tables, but should be considered between CDE Level 4 and the beginning of CDE Level 5.

(e) 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 concern. 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.

Consideration	Delay Fuzing/ Bomb Burial	VT Fuzing/ Air Burst	Shielding	Delivery Heading	Aimpoint Offset
Fragmentation	1	N/A	3	4	5
Blast	1	2	3	N/A	5
Debris	N/A	2	3	N/A	5
Penetration	N/A	2	N/A	N/A	N/A
Thermal	1	N/A	3	N/A	N/A
Delivery Error	N/A	2	N/A	4	N/A
Notes:					
1 -- Delay Fuzing that achieves 100 percent bomb 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 -- VT Fuzing that achieves an above ground/air burst detonation mitigates blast and debris effects and eliminates penetration effects. VT fuzing is applied as a significant mitigating factor for SSBMs in CDE Level 4 to account for inherent delivery errors.					
3 -- Shielding of collateral structures from fragmentation, blast, debris and thermal effects may be achieved by the presence of other combatant 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. A delivery heading on an axis measured from the nearest collateral object to the target aimpoint should be used for PGMs delivery against targets assessed at CDE Level 4 or Level 5. A delivery heading on an axis parallel to the nearest collateral object should be used for ASUGMs.					
5 -- Aimpoint Offset may mitigate fragmentation, blast, and debris effects when using PGMs. In some cases, applying aimpoint offset allows employment of larger warheads that achieve the desired effect and mitigate collateral damage.					

Table D-A-1. CDM Mitigation Techniques

(5) CDE Level 4 PGM Refined Assessment

(a) Step 1. Using the weaponeering decisions from CDE Level 3 and considering CDE Level 4 restrictions, either validate the weaponeering from CDE Level 3 or re-weaponeer the target to achieve the desired effect and CDE concerns.

(b) Step 2. Measure and record the distance between each aimpoint and the collateral concern(s) in the vicinity. Characterize and record the structure type for the collateral concerns as defined in the CDE Level 4A PGM CER Reference Table. If unable to determine the structure type, record it as “unknown” (Note: There are very hard and very soft building types in the list. Every effort should be made to identify the most reasonable match before choosing “unknown”).

(c) Step 3. Decide if the nearest or weakest collateral structure will be used or if each collateral structure will be assessed 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.

(d) Step 4. Compare the value(s) selected from the CDE Level 4A CER Reference Table to the distances between the aimpoint and collateral concerns measured in Step 2.

(e) CDE Level 4 PGM Refined Assessment Evaluation

1. If the CER value from the table for the selected weaponeering decision **is less than or equal to** the distance to the nearest collateral concern, the target is assessed as **CDE Level 4 Low (PGM, Warhead, Delay Fuze, Delivery Heading: degrees - degrees)**.

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

(6) CDE Level 4 ASUGM Refined Assessment. **Commanders are strongly cautioned that ASUGM use is highly discouraged at CDE Level 4 and above.** Use of ASUGMs should only be attempted when PGMs are not available.

(a) Using the CDE Level 3 weaponeering decisions and distances to the nearest collateral concern(s) and considering the CDE Level 4 restrictions, refer to the CDE Level 4B ASUGM CER Reference Table. Enter the table by delivery platform. Read across to the unguided munition planned for use to

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determine if the value in the table is less than or equal to the distance to the nearest collateral concern.

(b) CDE Level 4 ASUGM Refined Assessment Evaluation

1. If the CER value for the selected weaponeering decision is **less than or equal to** the distance to the nearest collateral concern, the target is assessed as **CDE Level 4 Low (ASUGM Restricted To** *(the weaponeering solution(s) developed in CDE 3 above, either single warhead: **Delivery Platform, Warhead, Delay Fuze, Delivery Heading: degrees - degrees** or multiple warhead: **Delivery Platform, Warhead, Delay Fuze, Delivery Heading: degrees**)*.

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

(7) CDE Level 4 SSBM Refined Assessment. **Commanders are strongly cautioned that SSBM use is highly discouraged at CDE Level 4 and above.** Use of SSBMs should only be attempted when PGMs are not available.

(a) Using the weaponeering decisions from CDE Level 3 and considering CDE Level 4 restrictions and the distance to the nearest collateral concern, refer to the CDE Level 4C SSBM CER Reference Table. Enter the table by weapon system, shell, and fuze. Read across to the appropriate technique of fire to determine the CER value.

(b) CDE Level 4 SSBM Refined Assessment Evaluation

1. If the CER value for the selected weaponeering decision is **less than or equal to** the distance to the nearest collateral concern, the target is assessed as **CDE Level 4 low SSBM** *(Restricted to the weaponeering solution(s) developed in CDE 3 above), **Caliber, Weapon System, Shell, Fuze, OA (or "P" Predicted)***.

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

f. **CDE Level 5 Casualty Assessment Overview.** CDE Level 5 is used when all reasonable and known mitigation techniques have been exhausted and some level of collateral damage appears unavoidable (CDE 4 High, CDE 3 High with outdoor concerns). In addition, CDE Level 5 is also performed when a Level 1 assessment determines CBR, environmental, and/or dual-use targets

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are factors. Once a target is assessed under CDE Level 5 analysis, the target remains classified Level 5 (regardless of the mitigation done previously) due to the level of risk and sensitive nature these factors represent for the combatant command and the national government. The CDE Level 5 casualty assessment answers the fourth and fifth questions of the CDM, “How many civilians and noncombatants do I think will be injured/killed by the attack?” 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 that they are assuming significant risk of collateral damage when engaging a target assessed under CDE Level 5.**

(1) Similar to the rest of the CDM, the casualty assessment is not an exact science. No precise means exists to predict noncombatant demographics and this effort is limited to the knowledge of the unique characteristics and cultural behaviors of the region and country as well as the population distributions, customs, and cultural practices, as well as particular habits unique to a region. As a reminder, the CDM does not take into account transient civilian or noncombatant personnel or equipment (unless precise data is known). **Therefore, it is critical that CDE Level 5 assessments are treated as estimates and should never be portrayed as an expected “casualty count.”**

(2) However, 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 considered a LOW violation.

(3) The supporting data, tables, and procedures for CE assist in estimating 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 target and who may approve the application of effects on the target. The primary decision aid is the noncombatant and civilian casualty cutoff value (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 CDE assessment. **CDE Level 5 constitutes the only level within the methodology where a final CDE assessment of “high” may be rendered. If a high assessment is rendered, the STAR process is then followed (see reference d) unless approval authority has been delegated by appropriate orders/instructions.**

(4) 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. Combatant commands are responsible for the development and maintenance of the demographic data used in the table for countries and/or regions in their AOR to support operational planning and execution. The IC is required to support this effort as needed and requested by the combatant commands.¹²

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

(b) Day and night factors are based on socialized cultural norms for daytime and nighttime functional activities. Episodic event factors are based on standard maximum population densities per 1000 square feet for the events described within the table. Combatant commands may use their discretion, experience, and current intelligence (e.g., pattern of life data) to determine daytime and nighttime cultural norms. If a reasonable assessment for daytime and nighttime cannot be made, the period of time between BMNT (begin morning nautical twilight) and EENT (end evening nautical twilight) for daytime and the period of time between EENT and BMNT for nighttime is the default.

(c) In cases where current intelligence is capable of providing a more refined estimate of population density in a specific collateral concern, that data should be employed in the casualty estimate (e.g., pattern of life).

(5) CDE Level 5 CE Worksheet and Computations. The CDE 5 CE Worksheet provides the standardized means to develop casualty estimates ensuring the CDM's intent of a simple, reasonable, and repeatable process. The worksheet assists the analyst in computing a casualty estimate for those indoor and outdoor collateral concerns or structures, located within or affected by a CDE Level 3 or 4 CER. After each collateral concern is estimated, add casualties from any CBR or environmental hazards and any known involuntary (or those of unknown status) human shields. The total is then rounded up to the next whole number to arrive at a total CE.

(a) Indoor and Outdoor Collateral Concerns. The dominant hazard to civilians or noncombatants located within indoor collateral concerns is blast, while the dominant hazard to civilians or noncombatants located within outdoor collateral concerns is secondary debris or crater ejecta from PGMs or ASUGMs and fragmentation from SSBMs. In these situations, the affected area of indoor collateral concerns is computed based on that portion of the indoor

¹² Joint Staff/J-2T is leading effort with the IC for tables to be produced for each combatant command ensuring standardized application of the CDM and facilitate continuity of operations across multiple AORs.

