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THE LAW OF NONCOMBATANT IMMUNITY AND THE TARGETING OF NATIONAL ELECTRIC POWER SYSTEMS

by

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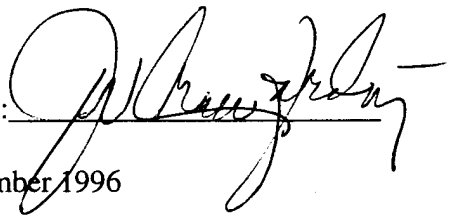
A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

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15.Abstract: The targeting of national electric power systems by aerial bombardment or aerospace power is an integral part of a wartime campaign. Destruction or neutralization of an enemy's electric power is alleged to have far-reaching strategic and operational effects on the enemy's ability to continue the war which extend beyond a mere military impact.

However, international law advocates and humanitarians argue that this form of warfare indirectly targets the civilian population because it destroys the civilian life support system and the essential elements of civilian sustanance. They view these "reverberating effects" as excessive and in violation of the discrimination and proportionality requirments of the international law of noncombatant immunity. The military asserts the concept of military necessity is controlling, and states that the direct and concrete military benefit derived from these types of air operations outweigh the harm to noncombatants and is not excessive in law or fact. These charges were brought to the fore by the U.S.-led Coalition air operations in the Persian Gulf war.

The intent of this essay is to briefly examine the reasons why the target set of electricity holds such importance for the military planner, to determine whether their view is based in fact or myth. Contrast the military's argument of necessity with the critics' claim of undue humanitarian fallout and disproportionality. Finally, assess the resurgence of the moral requisites of the Jus ad bellum (just war) and its impact on the Jus in bello (law of war).

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I. INTRODUCTION

> "Taken together, the synergistic effect of losing primary electrical power sources in the first days of the war helped reduce Iraq's ability to respond to coalition attacks."[1]

The aerial bombardment of national electric power systems has long been considered indispensable to an effective wartime campaign. From as far back as World War I to as recent as the Persian Gulf war, planners have focused on the neutralization of enemy power grids as a critical target set and the key to vital strategic centers of gravity. Specifically, proponents assert that attacking electricity results in particularly damaging "second-order" impacts on civilian morale, political leadership, military forces, and materiel production.[2]

The concept has been championed by Colonel John A. Warden, USAF (ret). His writings and intra-Pentagon staff discussions conceived the theory of the "Five Strategic Rings".[3] The *rings* conceptualize a device for the employment of aerospace power. Each ring represents a different facet of a nation's society; political leadership, economic systems, supporting infrastructure, population, and military forces. Colonel Warden's innovation lays the foundation for the notion of attacking the enemy from the "inside out, using airpower to skip over military forces such as armies in the field to strike directly at state leadership",[4] by targeting infrastructure and indirectly the civilian population. Therein lies the essence of a raging controversy and the focus of this composition. The age-old debate of military necessity versus discrimination and proportionality.

From the warfighter's perspective the military advantage gained via the targeting of national electric power systems justifies the unfortunate civilian impact. However, critics argue that the negative humanitarian impact significantly outweighs the military benefit derived therefrom. Substantively, they argue that the military's focus on *direct* harm to noncombatants is an outmoded

calculation for collateral damage in this age of increased weapon lethality and the catastrophic reverberating effects this technology works upon civilian life support systems.

The intent of this essay is to briefly examine the reasons why electricity as a target set holds such influence with campaign planners, to determine whether the basis exists in fact or myth. Contrast the military's argument of necessity with the critics' claim of undue humanitarian fallout and disproportionality. Finally, assess the resurgence of the *jus ad bellum* (just war) and its impact on the *jus in bello* (law of war).

II. DISCUSSION

A. The Target: Value and Vulnerability

Historically, electric power production has been viewed as a critical target set in every war since the early German Zeppelin raids on England during World War I. Essentially, in a very simplistic sense, the core of this traditional military orthodoxy is *value and vulnerability*. Those who advocate electric power as a target set, assert that the system's inherent vulnerabilities make it ideal for the application of aerospace power. The value-based doctrinal assumptions which have evolved therefrom, presume that the interdiction of electric power will have decisive strategic and operational effects throughout the five levels of society. Commentators have argued that the value aspect of this orthodoxy is fundamentally flawed and unsubstantiated.[5] These critics submit the experiences of World War II, Korea, and Vietnam as positive evidence.

Prior to pursuing the development of this theme, it would be beneficial to conduct a brief survey of the system itself. National electric power systems will differ in design and complexity, nonetheless, there are certain basic structural components and technical aspects common to power systems which permits one a general understanding of the operating requirements. Additionally, a

rudimentary understanding of the systemic configuration will serve to convey that aspect of prevailing military wisdom which I have identified as *vulnerability.*

A.1. National Power Systems

A generic electric power system is composed of four basic subsystems: generation, transmission, distribution, and control.[6] An electric system is built around the generation subsystem which consists of turbines and generators. Energy is applied from either a steam, hydro, thermal, or nuclear source to produce sufficient force to turn the blades of a turbine which then causes the associated generator to rotate, thereby producing bulk electricity.[7] The building(s) which houses the power plant, turbine and generator, is typically the primary target of a belligerent seeking to interrupt the electrical power of an adversary. Destruction of the generation subsystem permits electrical power to be interdicted at the source, the delicately machined blades and sensitive generators are extremely susceptible to damage from aerospace attack. Replacement components are not usually readily available due to prohibitive capital investment, therefore destruction of the turbine and generator will result in long-term power loss.[8]

Focusing the attack on the transmission subsystem is an alternative means of interdicting electrical power at the source. The key component in the transmission subsystem is the stepped-up transformer.[9] These transformers are located in a transformer yard (substation) located nearby the generation facility. Generated electricity is forwarded to the transformer where the voltage is stepped-up for transmission along high voltage power lines.[10] The voltage is sent to a load center where it is stepped-down and electricity is disbursed to users throughout the distribution network. The Office of Technology Assessment identifies stepped-up transformers as the primary node of

vulnerability within the transmission subsystem.[11] Further, unlike the generation subsystem which is shielded by a generator hall, stepped-up transformers are located in an open air transformer yard situated at the converging axis of the high voltage power lines, leaving the transformers vulnerable to aerospace strikes.

The distribution network presents a much less profitable target for aerospace power. Stepped-down transformer stations are smaller and present a less identifiable target for aerospace power. Supplied by a main power source, numerous distribution outlets are dispersed throughout the area to source localized power requirements.[12] Unlike their larger cousins, stepped-down transformers are of a standardized design and readily interchangeable.[13] Consequently, the impact of an aerial attack on this part of the overall system is short-term and restricted to the limited area sourced.

Control subsystems are designed to coordinate the interconnectivity of the generating facilities, physically accomplished through the transmission subsystem, to manage emergency power transfer and enhance reliability.[14] The control subsystem is effectively the brain of the national electric grid. A control center may be co-located with a power station and capable of managing the total integrated system, or it could be physically separated from the generating system, but still accomplish system integration.[15] Although an integrated system provides greater reliability, as power can be easily transferred from one area to another, it also presents a vulnerability. Targeting the control subsystem can produce "cascading" failures throughout the interconnected system leading to overloads and extended equipment failure.[16] The benefit to the

targeteer is obvious, disruption of the control subsystem has the potential to cause problems so severe that the burden of further aerospace attacks is substantially reduced.

A.2. Strategic Thought: Fact or Myth

Theoretically the synergistic effects of targeting schemes devised to *turn out the enemy's lights*, will extend beyond mere military consequences and have a decisive impact on his socio-political and economic infrastructure. A brief survey of history suggests that this assumption remains in doubt.

In World War II, both Allied and German planners, alike, designed air plans to exploit the hypothetical advantages posited by this frame of thinking. The Air War Plans Document (AWPD 1), gave the targeting of electricity the highest priority because German industry relied almost exclusively upon electric motor power.[17] Likewise, following their loss at Stalingrad, Nazi Germany through their Aktion Russland plan, sought to regain the momentum by attacking the Soviet's interconnected electric power grid.[18] However, AWPD 1 was never put into effect because wartime priorities overwhelmed peacetime planning, and continued battlefield setbacks precluded the Nazis from implementing Aktion Russland. Thus, at the close of World War II there continued to be significant interest in electricity as a target set, however, there was no concrete data to support the theoretical underpinnings.

During the early phase of the Korean War the targeting of electricity was virtually nonexistent. However, as the conflict wore on the Truman Administration began to look for a means of forcing North Korea and her communist sponsors to be more amenable to peace. The U.S. turned to the Air Pressure Strategy to accomplish this goal. Planners believed that by targeting

electric power they could coerce the opposition leadership to be more tractable.[19] Tactically the operation was extremely successful, but failed to achieve the sought after strategic results. China and the USSR stepped up their technical assistance, and North Korea was able to satisfy its electrical needs through portable generators. Despite the loss of primary electrical power the leadership maintained its resolve and continued to fight.

In Vietnam the U.S. once again resorted to airpower as a means of bringing the Ho Chi Minh government to heel. A primary target of Operation Rolling Thunder and Linebacker I & II, was North Vietnam's electric power. It was postulated that the systematic destruction of the electric power system would induce capitulation.[20] Similar to Korea, the operations were tactically successful, but strategic failures.[21] Despite the loss of nearly all electrical power the Hanoi government was able to implement sufficient curative measures (public conservation, manual tooling, portable generators, relocation of military industrial production) to sustain their efforts of unifying Vietnam.

Obviously the role of strategic bombing differs in context from total war (WWII) to limited war (Korea, Vietnam), however, history provides little proof of the purported diversity of effect, severity of societal degradation, and coercive political leverage theoretically derived by targeting national electric power production.

B. Targeting and the Law

At this point I would like to transition into a discussion of the contemporary international law of noncombatant immunity, primarily as it pertains to aerospace warfare and the forgoing discussion of electricity as a target set. Pertinent to this discussion is the reemergence of the jus ad

bellum as a relevant factor bearing upon the legal issues of the jus in bello.[22] Progress by the international community in the jus in bello had caused many to relegate the jus ad bellum to the dust bin of history. However, in the eyes of many law scholars and theologians, the means and methods of warfare employed in the Persian Gulf war and the justifications offered by the Coalition forces, in support thereof, has -- for better or for worse -- breathed new life into the principle of *just war*.

B.1. Noncombatant Immunity Issues

The requirement that an operational commander provide for the protection of noncombatants is a well-settled practice and universally accepted as both customary and conventional international law. The regime of noncombatant immunity requires belligerents to distinguish at all times between the noncombatant civilian populace and combatants, between civilian and military objects, and to direct military operations only against the latter. The principles of discrimination and proportionality are the fundamental components of noncombatant immunity and serve as the cornerstones of the jus in bello. Although the concept of noncombatant immunity evolved from the writings of St. Thomas Aquinas, it derives its present day construction from the Conventions of Hague and Geneva.[23] Applicable to the means and methods of warfare across the entire spectrum and in every medium, noncombatant immunity was originally developed to insulate civilians from the ravages of land warfare. However, the regime has had difficulty in keeping pace with weaponeering technology, nowhere is this more apparent than as it pertains to aerial bombardment.

Since 1938, there has been undisputed recognition of three principles of international law which are as applicable to warfare from the air as they are to war at sea or on land,

> "It is a violation of international law to bomb civilians as such and to make deliberate attacks upon civilian populations. Targets which are aimed at from the air must be legitimate military objectives and must be capable of identification. Reasonable care must be taken in attacking these military objectives so that by carelessness civilians in the neighborhood are not bombed."[24]

There has been general concurrence in the interpretation of these rules between the U.S. and humanitarian law advocates.[25] However, a primary point of contention continues with regard to the issues of military necessity, humanity, discrimination and proportionality as encapsulated in the concept of collateral damage (collateral damage and collateral casualties will be used interchangeably herein).

The U.S. Air Force defines military necessity as the principle which justifies measures of regulated force not forbidden by international law which are indispensable for securing the prompt submission of the enemy, with the least possible expenditures of economic and human resources.[26] Relative to the principles of military necessity, humanity, discrimination, and proportionality, use of force must at all times avoid or minimize civilian casualties and prohibit disproportionate and indiscriminate death and destruction. The crux of the debate between the U.S. military and humanitarians, abides in the quarrel over the methodology to be applied in the operational commander's pre-attack calculation of discrimination and proportionality relative to the military advantage to be gained and the extent of permissible collateral damage. At present, the U.S. view of proportionality is restricted to a prohibition on the direct or negligent targeting of civilians.[27] Furthermore, the U.S. view asserts that proportionality is calculated on the basis of an overall

campaign rather than on a target-by-target basis.[28] Humanitarians argue that the focus of the U.S. military on direct injury/death as the exclusive calculus for collateral casualties is a reflection of short-sighted thinking time-locked in a 19th century orientation. They assert that the collateral damage problem 21st century warfare and law must address, is not so much the direct civilian casualties that result from an attack, but the reverberating effects caused by attacks on civilian infrastructure, like electricity.[29] In their view this is the appropriate calculus for the determination of disproportionality and indiscriminate attacks. The humanitarian lobby further contends that, it is their assessment of collateral damage, rather than the U.S. view, that is required by customary and conventional international law. In support of this assertion they rely upon the requisites of Protocol I Additional to the 1949 Geneva Conventions.[30]

Protocol I sets out detailed rules and for the first time codifies the customary nature of noncombatant immunity law.[31] The basic premise of Protocol I is reflected by the following phrase,

> "...the civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited."[32]

A comprehensive discussion of Protocol I and the attendant controversy surrounding the document is beyond the scope of this composition. It is sufficient for the purposes herein to note that the Protocol has been hailed by scholars and statesmen, alike, as providing needed clarity to the rather abstract nature of noncombatant immunity law, eliminating from consideration certain categories of targets that had previously been deemed as lawful,[33] and establishing a precise definition of *indiscriminate attacks*. Protocol I includes within its definition of indiscriminate attacks,

> "those which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the *concrete and direct military advantage anticipated.*"[34]

At present, there are 145 parties to the Protocol, however it has yet to gain universal acceptance as the United States continues to withhold ratification.[35] The U.S. has not ratified Protocol I, due to what the Reagan Administration termed fundamental and irreconcilable flaws, thus, the U.S. is not bound thereby. Humanitarians argue that the U.S. failure to ratify the Protocol is a moot point, and provides the U.S. no defense against the binding character of the substantive law requirements contained therein. They cite U.S. military manuals on international law which use language consistent and in some cases identical with the Protocol,[36] and specific statements by DOS spokespersons, referencing U.S. support for many of the rules in the Protocol and concurrence with the customary nature of certain other aspects of the Accord.[37] In essence, the thrust of the argument, is that the United States is bound by customary international law as codified by Protocol I. The desired implication is that, customary law prohibits attacks which can be expected to result in excessive civilian casualties, the nullification of electric power is such an attack and therefore is tantamount to an indiscriminate use of force.

This debate raises a number of interesting questions, particularly in view of the occurrences in the Persian Gulf war, and returns our focus from noncombatant immunity in general, to the law as it pertains to the specific issue of electricity as a target set. The Gulf conflict is relevant as it is the most recent example of hostilities involving a significant number of diverse states from which modern nation-state practice may be gleaned. The Gulf conflict, especially with regard to U.S. aerospace operations, has caused many to wonder whether the principles of noncombatant

immunity continue to have any merit,[38] the issue is most articulately phrased by Judith Gardam's query,

> "whether the concept of proportionality has any content in customary international law independent of the prohibition of direct attacks on civilians, or of negligence in either the selection of the target or the conduct of the attack itself,...?"[39]

B.2. Is Chivalry Dead; Iraq

> "...Our air strikes were the most effective, yet [the most] humane, in the history of warfare"[40]

> "The enormous devastation that did result from the massive aerial attacks suggests that the legal standards of distinction and proportionality did not have much practical effect"[41]

The stark contrast between these two comments makes one wonder if they refer to the same set of hostilities. President Bush's comment reflects the view held by most Americans and echoes the numerous pronouncements by Coalition spokespersons that extreme care was taken to avoid damage to civilian installations. Notwithstanding these declarations of benign intent, it is difficult to reconcile the virtual total destruction of the Iraqi civilian life support system with the prophylactic requirements of noncombatant immunity. There was a strikingly evident imbalance between the supposed military advantage to be gained from attacking electricity and the discrimination and proportionality constraints devised for the protection of noncombatant civilians.

The Persian Gulf war has been heralded as the progenitor of the new age of *hyperwar*. The integration of space-based information systems, C4I, and warfare platforms, expanding the 20th century battlefield into the all encompassing realm of 21st century battlespace. Exploiting the presumptive weaknesses theoretically inherent in targeting the enemy's national electric power grid

is a primary component of the aerospace aspect of hyperwar. As alluded to earlier, doctrinally the concept of the five rings envisions an *inside out* approach to the enemy's strategic and operational centers of gravity. The Coalition aerospace operation, in large part taken from the warfare philosophy of Colonel Warden, was to put into effect the lessons learned from World War II, Korea, and Vietnam. The systematic nullification of the Iraqi national electric power grid, was designed to accomplish a dual purpose. First, planner's sought to cripple key elements of Iraq's military apparatus, specifically air defense systems, telecommunications systems and the command and control network.[42] Secondly, it was surmised that the degradation of electrical power would paralyze the leadership,[43] cause political turmoil and lead to the demise of Saddam's regime.

In terms of pure destruction and effective interdiction of electric power the operation was highly successful. Electric power in Iraq was, for the most part, terminated on the first night of the war, January 17th.[44] By war's end the Iraqi system had been reduced to approximately 15 per cent of its prewar capability.[45] However, the extent to which the intended purposes were achieved is less clear. The Title V Report, suggests that the foundational theories of targeting electricity were proven to be correct.[46] However, other opinions to the contrary, suggest that there is far too little evidence to make any definitive assumptions about the impact the loss of electricity had on Iraq's military capability and political cohesion.[47] It is conceded that the systematic neutralization of the electric grid did cause various sub-components of the Iraqi war machine to breakdown, however, there are too many outstanding variables to confidently assert that the historical trend as detailed above (that nullification of electricity has minimal effect) does not continue to hold true. Perhaps Iraq did not prove to be as resilient as North Korea and North Vietnam in resisting the effects of the

loss of electricity, however, the failing may be reflective of a more visceral distinction than evidence of the strategic and operational value of targeting electricity. In the case of the former two conflicts, enemy leadership was more resolute exuding a sense of purpose and will which inspired the combatants to seek the ejection of the invading foe from what they perceived as their homeland. Whereas Saddam's political gambit of the 19th province was apparently unconvincing to his troops. Additionally rather than being resolute, Saddam's will to fight was exceeded by his instinct to survive and continue in power, hence the attempted rapid withdrawal of the Republican Guard. In view of the paucity of empirical evidence[48] proving the real-term advantage gained, the devastation suffered by the civilian population as a result of the interdiction of electric power has been considered by many, including this author, as disproportionate.

The Administration clearly recognized that the systematic nullification of electricity and the concomitant impact on civilians would be a controversial issue.[49] The disagreement over Protocol I and the disparity in viewpoints on collateral damage would certainly come to the forefront. The Department of Defense Title V Report seeks to explain the rationale behind the targeting plan and allay criticism.[50] Public affairs releases, during the course of the war, aggressively refuted naysayers, constantly referring to the commitment of the Coalition forces to the minimization of collateral casualties.[51] General Glosson advised how targets and aimpoints were selected as to minimize collateral damage, reduce recuperation time and limit the impact on the civilian population.[52] In essence, the Coalition, led by the U.S., argued that not only did military necessity dictate the targeting scheme, but the desire to minimize casualties (combatant and noncombatant both) mandated the plan. Unfortunately, the death toll belies this rationale.

The Gulf War Air Power Survey (GWAPS) concluded that the systematic neutralization of the electric power grid was achieved with "remarkably little collateral damage".[53] The evidence supporting the GWAPS finding is undisputed, the incidence of unintended injury or death sustained by noncombatants as a direct result of aerospace operations was indeed surprisingly low. However, there is a caveat, this estimate fails to include the collateral casualties that resulted from the reverberating effects caused by the attacks. The Gulf war provides a real world laboratory within which the reality of *collateral damage (casualties)*, based upon the lethality of 21st century warfare may be examined. Never before has there been so much devastation visited upon a civilian population as a result of accurately placed munitions. Civilian harm was exacerbated by the fact that noncombatants were otherwise spared the direct effects of urban aerial assault by the use of Precision Guided Munitions (PGMs) and other highly efficient techniques which eliminated the life support systems, but left the civilians.[54] The impact on the health infrastructure was profound; reduced hospital capacity, inability to refrigerate adequate quantities of vaccines/medicines, water stations had limited capacity to purify/distribute water, and wastewater stations were incapable of treating/disposing of raw sewage increasing the incidence of water-borne disease.[55] Furthermore it was subsequently discovered that, agricultural production was significantly affected as the power loss reduced irrigation capacity to Iraq's arable land resulting in decreased yields.[56]

The U.S. accepts as customary international law the prohibition of the intentional targeting of drinking water installations, foodstuffs, crops, livestock and other objects indispensable to the survival of the civilian population. However in the case of Iraq, these very items of civilian sustainment were lost to the noncombatant populace as a result of the reverberating effects caused

by the accurate aerial bombardment of electricity. Some would argue that such is the price of war, however, this argument can only be justified if the nullification of electricity conferred a direct and concrete military advantage superior in its effect when balanced against the unintended casualties. As noted herein, there are a number of authors who either challenge the proof submitted by the U.S. as to the military advantage allegedly gained, or specifically assert that the complete destruction of the infrastructure of a highly developed post-industrial state was excessive and a violation of the Coalition partner's obligations under the law of noncombatant immunity.[57] The distinction between the intentional targeting of civilian life support systems and second order effects resulting from striking lawful target sets is far from artificial, although some would disagree.[58] Moreover, the problem presented by dual-purpose power grids is a conundrum worthy of Socrates. Nonetheless, the tens of thousands of Iraqi noncombatant causalities caused by the reverberating effects of the intentional targeting of electricity certainly argues for a consensus on collateral damage more in accordance with Protocol I than the current understandings.

It has been suggested that the international community would have never tolerated the collateral casualties resulting from the aerospace operations had the concept of a just or legal war not been in issue.[59] This is not to say that the Coalition claimed the standards of the jus in bello were inapplicable. As mentioned previously, the U.S. was quite adamant on the issue of Coalition compliance. However, the almost unanimous international condemnation of Saddam's attack upon Kuwait and the unusual restraint nations exercised in withholding criticism of Coalition/U.S. tactics reflects that the jus ad bellum has clearly reemerged as a substantive issue in the law of armed conflict. Specifically, "the interpretation of [the] proportionality [requirement] by the Coalition

forces reflects the perception that their use of force was a legal response to Iraq's unlawful force."[60]

The acceptance of the Coalition's overall activities in pursuit of their just cause, particularly the aerial bombardment in and around Baghdad, tends to provide an answer to the query of what constitutes acceptable collateral damage when assessing the direct and concrete military advantage? The U.S. view, as reflected below, of the legal obligation to minimize collateral casualties appears to have been confirmed:

a. only those attacks that intentionally target civilians; and

b. those involving negligence, either in ascertaining the nature of a target or in the conduct of the attack itself, so as to amount to the direct targeting of civilians.[61]

Under this reasoning a finding of *excessive casualties* cannot be asserted where care was taken in establishing the nature of the target and the attack was prudently executed.

III. CONCLUSION

Notwithstanding what at present appears to be the majority opinion, the debate on discrimination and proportionality will continue to rage. However, as more nations, like Great Britain, sign onto Protocol I,[62] the law will undoubtedly move toward the humanitarian opinion. The internal DOD debate generated by critical studies of U.S. aerospace operations targeting electricity in the Gulf[63] and the reconsideration of the viability of Protocol I, is reflective of a growing momentum toward consensus. There is no doubt that the nullification of electricity can potentially provide a short-term military advantage, such as degradation of enemy air defense systems. However, the reputed long-term strategic and operational benefits remain questionable. As 21st century warfare looms on the horizon, the events in Iraq reflect that greater restraint and increased limitations are required, that is, a behavioral change in the waging of war. As the

revolution in military affairs (RMA) takes hold and the rationale for defense strategy and planning shifts from threat to capability and from liability to opportunity the United States will be freer to think in terms of shaping the future.[64] Civilian leadership and military planners must contemplate how the blunt instrument of military force can be fashioned into the more precise political vehicle Clausewitz envisioned. As the sole surviving superpower U.S. state practice has substantial influence over the character of the international system. Shaping the rule of law in warfare for the better protection of noncombatants is an appropriate matter for the exercise of our international leadership. Failure to develop mutual understandings and nation-state initiatives to restrict certain means and methods of warfare, will result in noncombatant immunity becoming more of a theoretical ethic than a standard of substantive protection.

NOTES

1. U.S. Dept. of Defense, "Conduct of the Persian Gulf War", Final Report To Congress, Pursuant to Title V of the Persian Gulf Conflict Supplemental Authorization and Personnel Benefits Act of 1991, Public Law 102-25, p. 200.

2. Lt. Col. Thomas E. Griffith, USAF, "Strategic Air Attacks On Electrical Power: Balancing Political Consequences And Military Action", Strategic Review Fall, Fall 1995, 38.

3. Col. John A. Warden, III, USAF (ret.), "THE ENEMY AS A SYSTEM", AirPower Journal, Spring 1995, 44.

4. Daniel T. Kuehl, "Airpower vs. Electricity: Electric Power as a Target For Strategic Air Operations", The Journal of Strategic Studies, Vol. 18, No. 1, March 1995, 251.

5. Griffith, "Balancing Political Consequences", 39.

6. Lt. Col. Thomas E. Griffith, USAF, Strategic Attack of National Electrical Systems (School of Advanced Airpower Studies, Air University Press 1994), 5.

7. Ibid.

8. Ibid., 6.

9. Ibid., 7.

10. Ibid.

11. U.S. Congress, Office of Technology Assessment, Physical Vulnerability of Electric Systems to Natural Disasters and Sabotage, OTA-E-453 (Washington, D.C.: Government Printing Office, June 1990), 47, the OTA appraisal reflects that, similar to the turbine/generator combination, stepped-up transformers are unique and typically customed-designed for the specific power system, therefore spares are not in ready supply.

12. Griffith, Strategic, 8.

13. Donald G. Fink and H. Wayne Beaty, eds., Standard Handbook for Electrical Engineers, 12th ed. (New York: McGraw-Hill, Inc., 1987), 10-52, 53.

14. Burr W. Leyson, The Miracle of Light and Power, (New York: E. P. Dutton & Co., Inc., 1955), 47; Electricity Transfers and Reliability, (Princeton, N.J.: North American Electric Reliability council, October 1989), 25-27.

15. Leyson, 47; Fink and Beaty, 16-8.

16. Griffith, Strategic, 9.

17. Kuehl, "Airpower", 238-239.

18. Ibid., 242-243.

19. Kuehl, "Airpower", 246-247; Robert Frank Futrell, The United States Air Force in Korea, (rev. ed. Washington, DC: Off. of AF Hist., 1983), 478-480. The operation commenced in the summer of 1952. North Korea was blacked out for over two weeks, and over 90% of its electric power supply was eliminated, thus cutting off the many thousands of small, virtually home-operated, industrial facilities spread throughout North Korea. More importantly, the overall power supply within Manchuria was cut by 23% for the rest of 1952, and 60% of its key industries failed to meet their annual production targets.

20. Ibid., 248. The rationale for attacking the North Vietnamese electric power system was not to turn the lights off in major population centers, but, to deprive the enemy of a basic power source needed to operate certain war supporting facilities and industries. [General Earle Wheeler, Chairman of the Joint Chiefs of Staff Memorandum to President Johnson].

21. Griffith, "Balancing Political Consequences", 40. By the end of May 1967, 14 of the 22 electrical power targets, including generating plants and transformer substations, had been attacked, virtually eliminating electrical power production in North Vietnam. Eighty-five per cent of the generating capacity was destroyed and the transmission network was heavily damaged.

22. Jus ad bellum are the rules pertaining to the legality of the use of force which led to the development of the principle of just war. Jus in bello are the rules which govern the means and methods of war, which were synthesized into the Law of the Hague and the Law of Geneva.

23. R. George Wright, "Noncombatant Immunity: A Case Study in the Relation Between International Law and Morality", 67 Notre Dame L. Rev. 335, 335.

24. Prime Minister Neville Chamberlain, House of Commons, 337 Parl. Deb., H.C. (5th ser.) 937, June 21, 1938.

25. U.S. Air Force Pamphlet AFP 110-31, International Law--The Conduct of Armed Conflict and Air Operations, 19 November 1976, 1-6.

26. Ibid., 1-5/1-6.

27. W. Hays Parks, "Air War and the Law of War", 32 Air Force Law Review 1, 1990.

28. Ibid.

29. William M. Arkin, Greenpeace International, Aviation Week & Space Technology, January 27, 1992, 62-63; Walid Doleh, Warren Piper, Abdel Qamhieh, and Kamel al Tallaq, "Electrical Facilities Survey", Report by the International Study Team, Health and Welfare in Iraq After the Gulf Crisis: An In-Depth Assessment, October 1991.

30. Protocol Additional to the Geneva Conventions of 12 August 1949, Relating to Protection of Victims of International Armed Conflict, 1125 U.N.T.S. 3 (1977).

31. Ibid., Arts. 48 - 58.

32. Ibid., Art. 51.2.

33. Ibid., Art. 56, discusses the criteria involved with attacking targets that contain dangerous forces (dams, nuclear power plants, etc.).

34. Ibid., Art. 51.5(b).

Article 51:

5. Among others, the following types of attacks are to be considered as indiscriminate:

a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city,

town, village or other area containing a similar concentration of civilians or civilian objects; and

b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.

Found also at Art. 57(2)(a)(iii), "Excessive" was substituted for "proportionality" due to a disagreement in Committee, the Romanians argued that the term "proportional" was inconsistent with international humanitarian law. [Official Records of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, 1974-1977, Vol. 14, 299-316, 1977]

35. Siper Yearbook 1995, Armaments, Disarmament and International Security, (Oxford University Press, 1995), 867; George H. Aldrich, "Prospects For United States Ratification Of Additional Protocol I To The 1949 Geneva Convention", 85 American Journal of International Law, Vol. 1, 3 1991. The U.S. was a primary moving force behind the Protocol and signed it on the first day it was open for signature. However, subsequent to that event the Reagan Administration was advised that the document was incompatible with U.S. policy and practice, and thus elected not to submit the Protocol to the Senate for its advice and consent to ratification.

36. AFP 110-31, 5-7/5-8, Reflects that the U.S. Air force shall "Refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.

37. Michael J. Matheson, Deputy Legal Advisor at the U.S. Department of State, "The United States Position on the Relation of Customary International Law to the 1977 Protocols Additional to the 1949 Geneva Conventions", Speech on January 22, 1987 at the 6th Annual American Red Cross--Washington College of Law Conference on International Humanitarian Law: A Workshop on Customary International Law and the 1977 Protocols Additional to the 1949 Geneva Conventions.

38. George A. Lopez, "The Gulf War: NOT SO CLEAN", Bulletin of the Atomic Scientists, September 1991, Vol. 47, N. 7, 30-35.

39. Judith G. Gardam, "Noncombatant Immunity", 32 Virginia Journal of International Law 813, 1992, 831-32.

40. Conduct of the Persian Gulf War, Final Report to Congress, April 1992, 117, quote from President George Bush, 29 May 1991.

41. Oscar Schachter, "United Nations Law in the Gulf Conflict", 85 Am. J. Int'l L. 452, 1991, 466.

42. Kuehl, "Airpower", 251.

43. U.S. Air Force, Gulf War Air Power Survey (GWAPS), Vol. II, Part I, 93.

44. International Study Team, October 1991. The Team reported that at least 10 of 16 power stations visited were attacked on the first day of the war, and at least 14 were attacked multiple times, 1 of which was attacked 15 minutes before the ceasefire.

45. Kuehl, "Airpower", 254.

46. "Destruction of electricity had a cascading effect, reducing or eliminating the reliable supply of electricity needed to power NBC weapons, production facilities, as well as other war-supporting industries; to refrigerate bio-toxins and some CW agents; to power the computer systems required to integrate the air defense network; to pump fuel and oil from storage facilities into trucks, tanks, and aircraft; to operate reinforced doors at aircraft storage and maintenance facilities; and to provide the lighting and power for maintenance, planning, repairs and the loading of bombs and explosive agents. This increased Iraqi use of less reliable backup power generators which, generally, are slow to come on line, and provide less power".

47. Kuehl, "Airpower", 258. "The Iraqi strategic air defence system was certainly fragmented as intended by Coalition air campaign planners, but there is no way to determine analytically how much the loss of the electric grid contributed to this. The same holds true for damage to facilities involved in nuclear-chemical-biological weapons research."

48. Kuehl, "Airpower", 258 - 259.

49. Harvard Study Team, Harvard Study Team Report: Public Health in Iraq After the Gulf War, May 1991; International Study Team; Rick Atkinson, Crusade: The Untold Story of the Persian Gulf War (New York: Houghton Mifflin, 1993).

50. "Attacks on Iraqi power facilities shut down their effective operation and eventually collapsed the national power grid. This had a cascading effect, reducing or eliminating the reliable supply of electricity needed to power NBC weapons, production facilities, as well as other war-supporting industries; to refrigerate bio-toxins and some CW agents; to power the computer systems required to integrate the air defense network; to pump fuel and oil from storage facilities into trucks, tanks, and aircraft; to operate reinforced doors at aircraft storage and maintenance facilities; and to provide the lighting and power for maintenance, planning, repairs, and the loading of bombs and explosive agents. This increased Iraqi use of less reliable backup power generators which, generally, are slow to come on line, and provide less power. Taken together, the synergistic effect of losing primary electrical power sources in the first days of the war helped reduce Iraq's ability to respond to coalition attacks".

51. "Because of our interest in making sure that civilians did not suffer unduly we felt we had to leave some of the electrical power in effect, and we've done that". General Norman Schwarzkopf, Press Conference, 30 January 1990.

52. CENTAF Memorandum, from Brig. General Buster C. Glosson to All Plans Offices, Subject: Target Guidance, 12 January 1991. "...At electrical production/transformer stations the objective will be the transformer/switching yards and the control buildings in these yards. Boilers and generators will not be aimpoints." Unfortunately, confusion and other causation resulted in the guidance not being followed, 14 power plants suffered damage to its boilers, generator hall, or turbine assembly.

53. GWAPS, Vol. II, Part II, at 342-343.

54. William M. Arkin, Target Iraq: A Documentary History of an Air War (forthcoming).

55. International Study Team, Part 3, "Electrical Facilities in Iraq", 2.

56. Ibid.

57. Gardam, 828.

58. More radical opponents would consider the purposeful elimination of electricity an intentional attack upon the civilian population and as such, tantamount to terrorism. In substance no different than the recent Hizballa Katusche rocket attacks on Northern Israel. I tend to disagree and would debate this contention on the basis of *intent*. The Coalition forces were engaged in hostilities sanctioned under UN Security Council resolution, and the use of force was to achieve a military objective. In the case of Hizballa the use of force was an aggressive act, in violation of the UN Charter, done for the purpose of achieving a political objective. Hizballa and other terrorist organizations pursue their political ends without any concern for the probable consequences of noncombatant death and injury. In fact, their specific *intent* is to wreak indiscriminate havoc, death and destruction. Whereas the use of force by traditional armed forces, particularly the U.S., is based upon an interpretation of contemporary humanitarian law (the adequacy of which is a separate issue and discussed in this paper).

59. Gardam, 833.

60. Ibid.

61. Ibid., 834; Parks.

62. Major Ronald McClain, USMC, "Law of Combat Operations" Winter Elective 556 Lecture, U.S. Naval War College, Newport, RI, November 1995 - March 1996.

63. Griffith, Strategic; Kuehl, "Airpower"; and William M. Arkin, "Power Failure: Destruction of Electricity in the Gulf War", 1995.

64. Admiral William A. Owens, USN, "The Emerging System of Systems", Proceedings, U.S. Naval Institute, May 1995, 36.

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