

# On Impact

## Modern Warfare and the Environment A Case Study of the Gulf War

William M. Arkin, Damian Durrant, and Marianne Cherni

A Greenpeace study prepared for a "Fifth Geneva" Convention  
on the Protection of the Environment in Time of Armed Conflict  
(3 June 1991, London, UK)

A Roundtable Conference Jointly Organized by  
Centre for Defence Studies, Kings College;  
Greenpeace International; London School of Economics

May 1991

## Contents

<u>Forward</u>	1
<u>Overview</u>	5
Enduring Secrecy and the Gulf War	9
The Human Cost	14
The Natural Environment	16
Physical Destruction in Iraq and Kuwait	19
Protection of the Environment and the Laws of War	21
<u>The War</u>	25
War Objectives	26
Targets	27
The Air War	29
Increasing the Intensity of the Air War	30
Air Defeat	31
The Ground War	34
The Civil War	37
<u>The Human Cost of the War</u>	40
Iraqi Military Casualties	42
Allied Military Casualties	44
Kuwaiti Casualties	45
Iraqi Civilian Casualties During the War	46
Dislocation and Repatriation of Third Country Nationals	47
Civilian Deaths During the Civil War	47
Kurdish and Shiite Refugees on the Move	49
<u>Destruction in Kuwait and Iraq</u>	50
Kuwait After the War	52
Assessing the Damage	53
The State of Iraq After the War	55
Water Supply and Public Sanitation	57
Public Health	58
Food Supply	59
Looking to the Future	60
<u>The Effect of the War on the Natural Environment</u>	62
Assessing the Size of the Spill	63
Effects of Oil on the Gulf	64
Destruction of the Oil Wells and the Oil Fires	66
Black Rain and Smoke Effects	67
The Environmental Recovery and Clean-up Effort	70



Putting Out the Oil Fires	71
<u>Understanding Modern War</u>	73
Smart Weapons and Dumb Bombs	76
Assessing the Air Strikes	79
The Issue of Collateral Damage	83
Instances of Collateral Damage	85
The Amiriya Shelter Bombing	88
Destroying Bridges	92
Destruction of Nuclear Facilities	94
Nuclear Attacks	95
Nuclear Contamination	96
Targeting Chemical Facilities	98
Chemical Contamination	100
The "Baby Milk" Factory and the Targeting of Biological Weapons	101
The Destruction of Iraqi Military Command and Control	105
Massacre at Al-Mutlaa Ridge and the "Highway to Hell"	107
The Post-Ceasefire Massacre	111
<u>The Laws of Armed Conflict and Protection of the Environment</u>	114
The Concept of Military Necessity	115
Air Warfare, the Laws of War, and Legitimate Targets	117
Laws Protecting the Natural Environment	121
US Objections to the Geneva Protocols	123
Attacking Installations with "Dangerous Forces"	125
Carpet Bombing and Indiscriminate Attacks	127
Amiriya and the Bombing of Civilians	129
Retreat and Surrender	131
New Challenges with the Remnants of War	132
Iraqi Conduct and International Law	135
Iraqi Conduct During the War	136
Questioning Iraqi "Atrocities"	138
Oil Spills, Fires and International Law	139
Military Necessity and the Oil Fires	140
Iraqi Use of Napalm and Gas	142
Iraqi Reparations and the Enforcement of War Crimes	143
<u>Conclusion</u>	145
<u>Appendix A: The Weapons of the Air War</u>	A-1
<u>Appendix B: Legal Constraints on the Conduct of Warfare and Destruction of the Environment</u>	B-1



*Because of this the land mourns,  
and all who live in it waste away  
the beasts of the field and the birds of  
the air  
and the fish of the sea are dying.  
-- Hosea 4:3*

*For the true servants of the Most Gracious are those who tread gently on the earth.  
-- al Qur'an 25:63*



William M. Arkin is Director of Military Research at Greenpeace, and Director of Greenpeace's Nuclear Information Unit. He is author or co-author of a number of books on military and nuclear matters, including Encyclopedia of the US Military (1990) and Nuclear Battlefields (1985). He was co-editor and co-author of the first four volumes of the Nuclear Weapons Databook series. He has authored or co-authored the first six monographs of the Neptune Papers series on the naval arms race. He is contributing editor to the Bulletin of the Atomic Scientists, and co-author of its monthly "Nuclear Notebook" column. He was a US Army intelligence analyst from 1974-1978. During the Gulf War, Arkin headed the Greenpeace Situation Report (SITREP) team which produced 34 daily reports on the military, political and social implications of the war.

Damian Durrant is a Research Associate in the Nuclear Information Unit, specializing in European disarmament and non-strategic nuclear weapons. During the Gulf War, he was a member of the Greenpeace SITREP team, specializing in diplomatic initiatives and international law.

Marianne Cherni is Research Assistant in the Nuclear Information Unit. During the Gulf War, she was a member of the Greenpeace SITREP team, specializing in the human cost of the war, public opinion, and the peace movement.





Special thanks to the other members Greenpeace SITREP Team during the war -- Joshua Handler, Steve Schwartz, Jacquelyn Walsh, and Amy Wickenheiser, as well as to Laura Glassman, for research support. Gerd Leipold and Lena Ag provided invaluable advice and commented on drafts of the report. Thanks to James Burrus, Andrew Davis, Meg Duskin, Sheila Foote, Abigail Grossman and Bob Lyons for administrative and research support.

It would be impossible to name all of the people and organizations who gave us leads, pieces of information, and general advice. We would like to extend our gratitude to the following particular organizations and people -- some of whom are in the humanitarian aid field, and who still found time and energy to help us at a time that they were pressed to their limits: Alice Andrews and Terry Hayden of the American Friends Service Committee, the American Red Cross, Brian Best of Amnesty International, the Department of Defense Public Affairs Office, Leah Arnold of Doctors Without Borders, Omar Abdullah of the International Institute for Islamic Thought, Skip Baird of the International Red Cross, Rebecca Pereverzoff of the Mennonite Central Committee, Alex Sherbinin of the Population Reference Bureau, Chris George of Save the Children, Nancy Wallace of the Sierra Club, Pam Lewis of the Department of State, Kathy Sessions of the United Nations Association, the United Nations Environment Programme, Patricia Weiss Fagan of the United Nations High Commission on Refugees Office, the United Nations Library, and the World Health Organization.

A number of military officers and other US government analysts, who would prefer that their identities remain anonymous, provided useful advice and information during preparation of the report. The authors would like to thank them for their assistance and open-minded guidance.

A special thank you must be given to Katherine Wingersen of the Washington D.C. office of UNICEF who provided information and contacts during the SITREP effort and this report.



## Forward

The face of modern warfare has been changing before our eyes, but no one has taken particular notice. The Gulf War was short and decisive, yet it is impossible to say that it was "limited." New technology did not make the US military better at preventing destruction, it just made it more efficient at destruction itself. The damage of this war moved easily from battlefield, to country, to region -- refusing to be contained. Black smoke from burning oil fires knew no nation-state boundary, nor did the feet of fleeing refugees. The environment -- humans and their surroundings -- even more than in the past, were the untold casualties.

As the Gulf war loomed last winter, there was unprecedented attention paid to a war's potential environmental effects. The high level of interest reflected the global rise of environmental awareness, due in part to urgent warnings from the environmental movement and the scientific establishment about crises in the natural environment, and of mankind's global destructive capacity. The Brundtland Commission, in their report Our Common Future, observed:

When the century began, neither human numbers nor technology had the power radically to alter planetary systems. As the century closes, not only do vastly increased human numbers and their activities have that power, but major, unintended changes are occurring in the atmosphere, in soils, in waters, among plants and animals, and in the relationships among all of these. The rate of change is outstripping the ability of scientific disciplines and our current capabilities to assess and advise.<sup>1</sup>

The picture of the military in the post-war period became firmly rooted in imagery of the nuclear threat and global catastrophe. All but forgotten was the scientific community's great "advances" in the technologies of "conventional" military destruction. Modern warfare increasingly made use of the gains of high technology civilian society. It is an eerie statement to say that scientific advances provided more accurate information on how many smart bombs were needed to destroy a bridge in Baghdad, than on how many human casualties there would be. This display of efficient destruction and excision,

which swept aside traditional notions and skeptical presumptions of mass death and vast devastation disoriented the public, the military, and the policy-makers.

In discussions before the Gulf war, the characterization of what was to come was dominated by a premise based on a past idea of mass warmaking. Warnings were heard of years of possible combat, ala Vietnam, Afghanistan, or the Iran-Iraq war. Talk of mass casualties in a grinding armored battle in the desert filled the news media. Even during the air war itself, through the numerous videos of laser-guided weapons, there was a lingering belief that imagery of mass destruction was being denied by military censorship.

But this war ushered in a new era. This was airpower's war. This was a modern exhibition. An overwhelming application of military skill, combined with an integrated force of guns, aircraft, ordnance, and electronics, operated with synergy. In the weeks preceding the Gulf war, many military strategists argued that all of the military tools -- armies, navies, amphibious troops, as well as air forces -- would be needed to achieve victory. Even during the war itself, allied government spokesmen vacillated from their own euphoria, warning that airpower was not enough.

The caution expressed by the military, like the fear of the public, was itself derived from old doctrinal assumptions of what to expect from wars. The old rule, to seize and occupy, took on new meaning in the Gulf War. In this war, boundaries disintegrated. Iraq became prisoner more to a lack of energy than to any military force. Now that the war is over, we are returning to old divisions, ignoring the lessons of the integrated nature of our societies, and the weakness of boundaries. Stories of the raging oil fires, or the uncontrolled oil spills, defines only a small portion of the war's effects. The Global 2000 Report of the Carter Presidency attempted to describe the inseparable link between humans and their natural environment:

So intimate is the linkage between humankind and the environment that the distinction between individual and environment blurs. Some of the air we breathe becomes part of us. The oxygen metabolizes our foods and becomes a part of our flesh and blood...the term 'environment' --i.e., human **surroundings** -- is an inadequate and inaccurate concept because

there is not and cannot be a sharp distinction between humankind and its surroundings.<sup>2</sup>

Perhaps a one-dimensional understanding of the war's impact is due to our failure to fully understand the environmental problem. This is natural, given that the "environment" persists in not having a human face -- it is "green." The environment's pictures are trees, air, water, land, and in this war -- oil.

Public worry persists over the burning oil wells and oil spills, as well as for the plight of the Kurdish peoples. But they are taken as two separate issues. They are both "environmental problems," however, and each one in its own way challenge our principles of international governance and law. The Gulf war started with Iraq's invasion of Kuwait, and statements abounded about the violation of a nation's sovereignty, and its illegality under international law. The response to the Kurdish crisis raised the same principles, but this time society was so obviously in favor of helping the Kurdish people, that Iraq's sovereignty was swept aside to achieve a greater humanitarian and global good. The international community took the unprecedented step of forcefully violating a country's sovereignty to set up camps and safety zones for the Kurds.

Historically, many countries have used "humanitarian" reasons for military action. But rarely has a state intervened militarily for a group of people because of internal human rights violations. The world has stood by and watched in case after case of atrocities -- in Cambodia, Uganda, Tibet, Timor, even in the slaughter of the Kurds in the past. Why did this war provoke a different response?

A prime difference of the experience in the Gulf war was that we -- the eyes of the world -- were there. Even though western public opinion was solidly behind the war effort, public opinion did not care to distinguish between the political goal of getting Saddam Hussein out of Kuwait, and the moral requirement of saving the lives of people in need.

It was not just the telescopic eyes of the media that saw this war in the Gulf. The military was also there. The aftermath of this war has provided an unusual role for soldiers -- repairing the damage, and helping the victims. Perversely, air power, the technology that allowed the allied militaries to utterly destroy Iraq, also provided an

otherwise unavailable capability to feed hundreds of thousands of refugees. As one relief worker stated:

If someone has the power to wound or to heal, you look to them to have the moral depth and vision to use that power to heal. You regret and intervene when that power is used to wound. But one is truly baffled when that power is used first to wound, and then to heal. This is the scene that has unfolded as the US military hustles humanitarian supplies to the refugees.<sup>3</sup>

The military establishments, who demand such a huge amount of society's resources, found that they could not turn away from the human face of war. The military's humanitarian gesture forces us to ask just where the killing begins: The air war? The invasion? The "security" of oil? Society's material disparities?

This is the central question raised by the Gulf war. Who is the real criminal when lives are lost, and the environment is scarred and damaged? In a world illuminated by the iridescence of television, that question became irrelevant. The people of the world who were against the actions of Saddam Hussein, and the people of the world who were against President Bush and the coalition, stood together as the environmental devastation and humanitarian need unfolded. As Dwight D. Eisenhower once said, "Every war is going to astonish you." This war was no different.

## Overview

The Gulf War is the most momentous and destructive war in modern history. It has inaugurated a new military era, where rapid, flexible and overwhelming use of modern weapons and electronics are the new standards. In the Gulf War, technology blinded and crippled a heavily armed opponent who was primed to fight the last war. The impact was unprecedented environmental ruin -- the most efficient killing campaign ever executed by any military force; one of the largest movements of civilians in the shortest periods of time; the worst oil fires in history; and one of the biggest oil spills. "Hyper war" is the name some in the Pentagon have already coined for the new model. In 43 days of intense combat, more Iraqis died than in the eight year long Iran-Iraq war.<sup>4</sup>

This was a thoroughly modern war, "a bombing campaign that was at once surgical and earth-scorching," said Newsweek magazine.<sup>5</sup> An air campaign "unprecedented in its intensity, precision, and lethality," Air Force Magazine concluded.<sup>6</sup> Given the war's duration, the energy of the air and ground war dwarfed any other conflict in the post-war period. From the very first hours, Iraq's entire military capability was virtually nullified. Within a few days, the war was won.

The stunning air victory is already being heralded as ushering in a new era in warfare, where smart bombs, cruise missiles, stealth fighters, and electronic weapons overwhelm an opponent's military force with a minimum of casualties. But this is only one model for understanding the war. It fails to take into consideration the effects and the aftermath of the conflict. For all the efficiency and economy of purpose displayed by allied forces, the Gulf War was unprecedented in the amount of destruction inflicted on a nation with "conventional" weapons in so short a period of time. It left a civil society reeling and completely disrupted, and the natural environment unusually scarred. These are also the attributes for a model of modern war -- unavoidable impacts for future wars fought in complex urban societies.

The Gulf War certainly demonstrated the power of an integrated electronic army. Through technological superiority, and aided by the intangible qualities of training,



preparation, leadership, and motivation, the allies were able to minimize casualties to their own forces, and maximize the effect of their attacks. "In air-to-ground strikes, with roughly one percent of the bombs we dropped in Vietnam from 1961 to 1972 (6.2 million tons)," Air Force Secretary Donald Rice said after the war, "air power paralyzed Iraq strategically, operationally, and tactically."<sup>7</sup>

US and allied aircraft averaged 2,500 combat sorties daily, including more than 1,000 bombing missions where almost 6,000 bombs, and over 2,000 tons of munitions were dropped. The intensity, given the short period of time, was not necessarily unprecedented. The sustained pressure and unlimited scope of combat, however, were unique and completely stunned Iraq. In one day of the Gulf War, there were as many combat missions flown against Iraq as Saddam Hussein experienced in the entire Iran-Iraq war.

Armies of almost two million soldiers faced each other in the desert, and the end result was one the most lopsided military victories in the history of warfare. Originally a 30-day air war had been planned, one that because of a combination of "weak battlefield intelligence, clever Iraqi camouflage, mobile targets and bad weather" was extended to 39 days.<sup>8</sup> One of the most brutal ground assaults in history followed the deadly air attack. Some 350 soldiers of the allied international force lost their lives in the fighting, while 100,000-120,000 Iraqi soldiers were killed.

For all of the war's unique conditions, memories of the Vietnam War continued to haunt the US military. These "lessons" that the military leadership brought to the Iraq war became its guiding rules -- no "micromanagement" from the White House, no confusing objectives, no gradualism, no "body counts," no press interference, and no time for public protest. "This will not be like Vietnam," Maj. Gen. Robert Johnston said in Riyadh on 8 February. "We can measure our success here because our objectives are to get the Iraqi's out of Kuwait. That's measurable in terms of real estate somewhere down the road."<sup>9</sup>

Added to the seeming simplicity of the military objective was the ferocious and singleminded execution of the allied plan. The attacks were unrelenting and uncompromising. On 30 January, Gen. H. Norman Schwarzkopf, commander-in-chief of

all forces in the region, brushed aside any notions of a "pause" for negotiations: "...we have no intention whatsoever of terminating this military campaign until we've accomplished the objectives that were announced at the outset." Gen. Calvin Waller, Schwarzkopf's chief of staff, stated the next day what the US would do if Iraqi forces decided not to surrender -- "Then we will grant them their last dying wish."

To facilitate military freedom for Schwarzkopf and his subordinates, President Bush chose not to "interfere" with military operations, ultimately absenting himself from close political oversight of the war.<sup>10</sup> It was reported, in fact, that President Bush did not even know the specific targets that were being bombed in Iraq.<sup>11</sup> Gen. Schwarzkopf and other military leaders refused to address Iraqi casualties, specifically referring to their own bad experiences in Vietnam. Despite the high degree of public and press interest in the effects of the war, President Bush and other US political leaders still stood back, indifferent to the lack of information.

Allied political leaders, and their viewpoints, were even less in evidence. Despite the participation of over 30 nations in the allied international force, no one would ever make the mistake of calling this war the Third World War. It was very much a US affair; the US commanded the forces, designed and controlled the war plan, and did most of the fighting. For all of the international consensus and approval sought to justify the conflict, the war moved far too quickly for any traditional political or diplomatic interventions or constraints to be felt. Ultimately, high level officials of three countries -- France, Italy, and Turkey -- resigned in protest at their countries' policies and conduct, but their acts were hardly even felt.

It is wrong to say that this war was unrestrained. The US military, and by example its allies, were constantly mindful of international public opinion. The fear of losing public support influenced military policy from the beginning. The war was to be short, with allied casualties to be kept at an absolute minimum. There would be no indiscriminate bombing of civilian targets or cities. A higher percentage of precision guided weapons would be used than ever had been used before in combat. Controversial weapons such as napalm and fuel air explosives were not to be used against people. Much effort was made to restrict "collateral damage" to non-combatants. In fact, aircraft

hit their targets almost twice as often as they did in the Vietnam War.<sup>12</sup>

These self-imposed restraints may be impressive by way of carrying out the military's own "no more Vietnams" mandate -- no indiscriminate destruction, no napalmed children, no defoliated jungles. Saddam reacted in what seemed a different era of warfare with his own scorched earth destruction -- unleashing one of the world's worst oil spills, and setting almost 600 oil wells ablaze. But ironically it was the efficiency of the allied military destruction, even within what the war planners considered to be their exemplary and unprecedented care, that ultimately caused vexing devastation. Surgical war had finally arrived, and the patient was skillfully carved and disemboweled.

The Gulf War did not bring grinding war or "mass" death. But what proved to be an allied strategy to minimize its own casualties exacted a heavy toll on the nation of Iraq. The social and economic fabric of the society was completely disrupted, and these effects will be significant and long term. Efficient attacks rapidly and irrevocably cut off electricity, denied fuel, halted communications and transportation, and production, leaving the Iraqi leadership, and the Iraqi people blind and isolated. Such blazing attacks effected every single aspect of modern society, not just military functions. Hospitals went without electricity and heat and back-up generators ran out of fuel. Health facilities became understaffed because doctors and nurses could not transport themselves to work, and patients could not even reach hospitals in the first place.

For all of the fanfare that accompanied the extensive use of smart weapons, their use may have had an even more profound effect on non-combatants than dumb bombs. It was damage to the civil infrastructure that in the end was precise. And it was smart weaponry that induced targeters to seek out the fabric of modern society: local telephone exchanges, non-military oil refineries, electrical generating plants, and civil ministries.

The real need of such attacks, to be sure, does not stand up well to the test of "military necessity" and the standards of a just war. But "hyperwar" was also foreign to military planners, and they occasionally reached back into previous wars for lessons and examples. War strategists and planners sought non-military effects from their attacks on Iraq's civil lifeline. Even given the short duration that they postulated for the conflict, planners mechanically selected "demoralization of the civilian population," and

undermining of the nation's "will to fight" as a secondary objective of their bombing campaign.

The Gulf War was, in the end, a combination of the old and the new, producing results that fully astounded the participants. It was a war that was always in the shadow of weapons of "mass destruction" -- nuclear, chemical, and biological -- where the public was primed as never before to anticipate their use. Perversely, though, this was a war where the "mass" weapons didn't kill masses, the conventional weapons -- smart and dumb -- did. Aircraft delivering "cluster bombs" with over 10 millions "submunitions" took the largest human toll in the Iraqi military. In the end, the amount of damage that was caused was determined by the very duration of the war, rather than by tactical military need.

The war, and the killing, didn't end on 28 February. Within days after the ceasefire, a brutal civil war erupted in Iraq, civilian casualties mounted, and millions of refugees began fleeing Iraq's internal military repression. "Hyperwar" had come and gone, but the destruction continued, and the effects could not be contained. Oil fires burned out of control, and oil spills -- already over a month old at the ceasefire -- were unattended. Kuwait was depopulated and stripped of the equipment and infrastructure of modern society, and Iraq's own civil works were at a standstill, with as much as a third of its population either embroiled in fighting or displaced from their homes. The war's pace, even after the ceasefire, was strangely foreign, moving far too quickly for the international community to digest.

### **Enduring Secrecy and the Gulf War**

Any accurate assessment of the conduct and the impact of the Gulf War is complicated by a severe lack of information. The paucity of data includes the state of Iraq's population, and the impact of the war on the natural environment. This is the result of aggressive policies of secrecy on the part of the Bush Administration and allied governments. Not only has there been direct suppression of information on the war's effects, but an air of total indifference exists on the part of the US government to respond to questions about the human and environmental destruction.

From the very beginning of the crisis, US and allied governments worked hard to control the flow of information to the public. Initially, the US government sought to rally public support for the deployment of American forces. In the Fall of 1990, as Bush Administration officials fixed upon offensive military action, their release of selected information was used to find the right formula to mobilize public support. Thus President Bush exaggerated Saddam Hussein's nuclear weapons capability, and stories started circulating about Iraqi military prowess. During the war itself, the news media was denied free access to US troops, and even "pool reporters" in combat units were specifically kept away from any combat scenes that the military did not want the public to see.<sup>13</sup> This, combined with self-censorship on the part of the media, resulted in virtually no television images of human deaths being broadcast.

In the post-war period, the control of information extends from discussions of casualties during the war, to the environmental effects and health hazards of the oil spills and fires. It appears that there is a widespread effort underway on the part of the Defense Department and the Bush Administration to downplay the environmental consequences, human and physical, of the war.

Only one day into the air war, on 18 January, Gen. Schwarzkopf said at a briefing in Riyadh that "I'm never going to get into the body count business," referring to the Vietnam War. Throughout six weeks of bombing, and 100 hours of ground combat, military spokesmen refused to give any estimates of Iraqi casualties. And three months after the ceasefire, the US (and the allies) have still not provided an authoritative accounting of the human cost. It is even unknown how many Kuwaiti civilians actually died or were wounded in the invasion or occupation, or how many perished during the air and ground wars. Even the number of allied military casualties is hard to come by.

When the war ended, the White House reportedly ordered Gen. Colin Powell to make an estimate of the number of Iraqi deaths.<sup>14</sup> Two weeks after the White House request was made, Powell told reporters that he had "no estimate whatsoever" of how many Iraqi soldiers were killed.<sup>15</sup> "I know there's a great interest in this subject," USA Today quoted the General as saying, "I don't have a clue and I don't really plan to undertake any real effort to find out."<sup>16</sup>

In addition to the downplaying of human casualties during the war, there were significant impediments placed in the way of independent efforts to assess the environmental damage. While the war was still underway, the Saudi national oil company ARAMCO held information on the spill as "top secret," and told journalists that data would be released only at official briefings or by allied military authorities. A team of oil spill experts convened by the United Nations Environment Programme (UNEP) to help respond to the spill were reportedly denied access to the spill area by Saudi and military authorities. Other experts in the region were also denied access, and many have since denounced the lack of information available, and the poor cooperation displayed by the Saudi government.

After visiting Kuwait in March, Michael Gwynne, director of UNEP's global monitoring system said, "There is a reluctance to take action" on the fires and spills, saying that the international community was not adequately responding to the environmental disaster.<sup>17</sup> John Walsh, director of the World Society of the Protection of Animals, said on 6 April that he thought the Kuwaiti government was "deliberately downplaying" the death of birds caused by the oil fires.<sup>18</sup> According to New Scientist magazine, "A task force of experts from the US, Britain and Canada that has toured the Gulf has been discouraged from talking about the slick."<sup>19</sup> Other eyewitnesses said in April that the Kuwaiti and US governments were making it difficult to collect information, and that the Saudi and US governments were holding back on the information they had on the effects of the spills. UNEP officials have also complained about a lack of information they have.

On 26 March, in response to concerns expressed by families of US soldiers in the Gulf, Pentagon spokesman Pete Williams said that the US Environmental Protection Agency (EPA) "has concluded that there is no imminent danger" to US troops or other people in the Gulf as a result of the air pollution caused by the fires. When asked, an EPA spokesman said in response that the agency had issued no such conclusion, "Maybe he's got information that we don't have."<sup>20</sup> In fact, the Defense Department's assurances were totally unfounded. On 1 April, Navy Times, for instance, reported that military doctors were treating soldiers for "smog-related" upper-respiratory and eye

ailments.<sup>21</sup> The World Health Organization later warned residents of the region in risk categories to stay indoors when the smoke cloud was overhead. At the end of April, doctors in Kuwait were advising anyone with chronic respiratory problems not to return to the country.<sup>22</sup>

Military officers readily admit that downplaying the issue of casualties was a means of trying to control international opposition to the war. Secrecy soon took on a momentum of its own, with no one in Congress or the Executive Branch intervening. Even after the war was over, the US military declined to estimate war dead. But they made it clear that the intent was purely political. A Riyadh-based spokesman for US forces told the Washington Post a month after the ceasefire that providing the numbers of dead "gets into the business of enemy body counts, and we have said we are not going to do that."<sup>23</sup>

There are a number of stories that have come back from the ground war which question whether US forces handled war dead in accordance with the provisions of the Geneva Convention. As the Washington Director of Human Rights Watch wrote on 12 March, "US and allied forces in Iraq are not even attempting to comply with their obligations under the Geneva Conventions."<sup>24</sup>

The secrecy and lack of information concerning the effects to the natural environment has more complicated political justifications. The governments of Kuwait and Saudi Arabia have made it clear to the US government that they desire to control the movements of members of the media, as well as representatives of relief and environmental organizations. They have insisted on controlling and approving the release of information about environmental damage in their countries, making available very little of the information they possess. "With many Kuwaitis remaining out of their country two months after the end of the Iraqi occupation," the New York Times wrote on 28 April, "this country seems in little hurry to measure the long-term health peril..."<sup>25</sup> Scientists from the Kuwait Institute for Scientific Research and Kuwait University have organized the country's first private environmental activist group -- Kuwait Environmental Action Team -- because they felt the government was not providing enough information.<sup>26</sup>

There are a number of explanations as to why Kuwait and Saudi Arabia, as well as the United States, might not want a full disclosure of information about the war's environmental damage. First, there is a desire on the part of Kuwait and Saudi Arabia to reassert a degree of sovereignty over access to their countries, and having environmentalists and reporters roaming freely around undermines that goal. Second, both governments have been criticized for their slowness and incompetence in responding to the clean-up and recovery needs.<sup>27</sup> Third, there is still a large percentage of Kuwaiti citizens outside the country, and the Kuwait government fears that bad news about the public health conditions will discourage them from returning.

Finally, some have suggested that the US government has specifically discouraged the collection and evaluation of effects data. At the end of January, the Department of Energy alerted the National Laboratories -- Livermore, Los Alamos, and Sandia -- to "immediately discontinue any further discussion of war related research and issues with the media until further notice." A 25 January letter directed Livermore Laboratory to say that "Most independent studies and experts suggest that the catastrophic predictions in some recent news reports are exaggerated."<sup>28</sup> In early February, the National Oceanographic and Atmospheric Administration (NOAA) detected unusually high amounts of soot in the air in Hawaii. Yet the information was never widely released. One explanation provided by a close observer of the politics of environmental science was that higher officials in the US government felt that publicizing the information might give added credence to the predicted scenarios of global environmental effects, about which the US government remains on the defensive. In addition, as Congresswoman Nancy Pelosi points out, despite warnings of the environmental effects of the war, "much of the advance planning needed to address this crisis was nonexistent."<sup>29</sup>

The selective release by the military of video images of successful strikes against discrete targets created the impression that the military knew everything that was going on. But the "fog of war" was as big a problem in this war as in others. In the second week of the war, for instance, it was reported that President Bush was frustrated that the military couldn't give him more information on the effects of the bombing. "He thinks people are getting as full a picture as we have," White House spokesman Marlin



Fitzwater said. "He just wishes we had a better one. I mean, President Bush has asked for the same kind of damage reports that you have, and it's just not there."<sup>30</sup> When the US military received an inquiry from the Washington Post about accidental bombing of the Adan Hospital south of Kuwait City, the spokesman stated that "We have no knowledge of a hospital being bombed or suffering collateral damage by coalition aircraft in Kuwait City."<sup>31</sup>

Nevertheless, the only conclusion that can be drawn is that specific political decisions are being made at the highest levels of the Defense Department and the US government to downplay and keep information secret about the effects of the war. The Department of Energy letter, and accounts by Washington-based government environmental experts and military officers, all support the conclusion that, even where information is known, it is not being publicly released unless it has to be. Gen. "Tony" McPeak, the highest ranking officer in the Air Force, admitted in a candid interview on 20 March that he "knew of several" mistakes the US had made in the bombing of Iraq. "I've got photographic evidence of several where the pilot just acquired the wrong target." When asked when the information would be released, he answered, "It ain't my call. I made some recommendations about this, it got turned around, quite frankly...."<sup>32</sup> Absent a bombing and environmental damage survey, many outstanding questions about the war will remain unanswerable for some time.

### **The Human Cost**

The effect of the Gulf War on the human environment was far greater than is commonly believed. In contrast with the prevailing image of the precision of smart weapons, a view bolstered by the low casualties on the US side, 110,000-140,000 Iraqis died from US and allied action, more than the number who died in the eight-year long Iran-Iraq war. The Iraqi death rate, in addition, was at least double the death rate per day during the Vietnam war. Iraqi deaths averaged more than one person for every ton of explosives dropped; twice as efficient a rate of killing rate than the average of one person for every two tons of explosives in Vietnam; or near four tons in Korea.<sup>33</sup>

During the embargo period, the war, and its aftermath, the lives of over six

million people were directly effected by the war, either being killed or wounded, made refugees, or losing their homes. The human toll can be summarized as follows:

- 151,000-183,000 people -- Iraqis, Kuwaitis and allied soldiers lost their lives as a result of the Gulf War as of the beginning of May.

- 100,000-120,000 Iraqi military deaths occurred, 5,000-15,000 Iraqi civilians died during the war, and 4,000-6,000 civilians died since the end of the war due to wounds, lack of medical care, or malnutrition.

- 49,000-76,000 Iraqi civilians have died as of the beginning of May. During the month long civil war, 20,000 Iraqis are estimated to have died, and another 15,000-30,000 Kurds and other refugees have died on the roads or in camps.

- Of Iraq's 100,000-120,000 military deaths, some 50 percent were killed during the 100-hour ground war between 24-28 February, and during a military engagement on 1 March after the ceasefire.

- Only 10-20 percent of the civilian casualties occurred during the 43-day air and ground war. Eighty to ninety percent occurred after the war ended, in the aftermath, in the civil war, and during the refugee exodus. This percentage will increase, as the number of post-war deaths escalates.

Assuming military and civilian deaths just during the 43-day war, about 110,000-135,000 Iraqis died, or an average of 2,500-3,000 people a day. This is almost three times the daily average of deaths during the Vietnam War, based on the estimate of 3,000,000 North Vietnamese, Cambodian and Laotian deaths in a seven year, four month period (1965-1974).

The Gulf War resulted in the largest movement of people in the shortest amount of time in any modern war. More than five million people, including Iraqi and Kuwaiti innocents on the southern battlefield, residents of Basra and other southern cities and towns, Shiites, Kurds, rebels, and foreign workers and their families, found their lives disrupted directly by the Gulf War.

The movement of such a mass of people continues to have enormous repercussions. It is estimated that 20 percent of the refugees on the Turkish border still don't have shelter at the beginning of May. In addition, another 1.2 million people

remain along the Iranian border, surviving under primitive conditions. "Here we are watching the Valleys of Sorrow become the Valleys of Death," Lionel Rosenblatt, Executive Director of Refugees International said.

The human effects of the Gulf War cannot be told solely in statistics. The numbers continue to grow everyday -- not only in refugee deaths -- a minimum of around 1,000 refugees are dying daily,<sup>34</sup> but in an untold number of human lives being affected because of poor medical care and impure water. Through the beginning of May, at least 30,000 people in the refugee camps alone had died. And that number, according to relief experts, will continue to escalate. With summer temperatures in Iraq reaching 45-50 degrees Celsius (113-122 degrees Fahrenheit), the quantity of water needed increases significantly, and the heat will increase health risks. And winter is only five months after that.

The intangible human losses -- quite simply -- cannot be counted. Over two million foreign workers have returned to their countries of origin from Iraq and Kuwait -- herded through "transit camps" to countries with long-standing economic problems and severe unemployment. Forty-five percent of Iraq's remaining population is under the age of 15. This is the population at greatest risk -- a third of the over two million Kurdish refugees are estimated to be under the age of five. Numbers are not available for children not returning to schools -- during the Iran-Iraq war the drop-out rate quadrupled. Iraq's sophisticated medical system, which adequately served one of the youngest populations in the world prior to the war, remains essentially defunct in May. Barely caring for the wounded and sick, immunizations are missed and preventative medicine has ceased.

### **The Natural Environment**

The Iraqi occupation of Kuwait, and the war to dislodge Iraq, left behind an environmental disaster in the air, in the water, and on land. The war had barely begun before there was a shocking impact on the environment. On 22 January, there were reports of intentional fires being set by Iraq at three Kuwaiti facilities. On the same day, the Washington Times reported that chemical protection units along the Saudi-Kuwaiti

border had detected chemical agents in the air, assumed to be the result of the bombardment of chemical factories or weapons stockpiles. The next day, the Iranian news agency reported that explosions heard "were so powerful that buildings in the Iranian port of Khorramshahr, 25 miles southeast of Basra, were severely jolted."<sup>35</sup> On 24 January, reports started coming in that "black rain" from fires had fallen in Iran.

The environmental ruin continued to mount, as Iraq set out to intentionally cause great damage, flooding oil into the Gulf, and destroying Kuwait's entire oil infrastructure. Oil currently covers hundreds of square miles of Gulf water as well as hundreds of miles of beaches. Rivers of oil cover large areas of the sandy flatlands, and hundreds of blazing oil fires pump smoke, soot, and toxic chemicals into the sky. "The howling winds that blow across the desert this time of year spray a sticky grit over everything," the Washington Post observed.<sup>36</sup>

The oil fires are believed to constitute one of the world's "gravest air pollution disasters," the New York Times wrote.<sup>37</sup> Even the US government interagency task force on the oil fires concluded that "The fires may represent one of the most extraordinary manmade environmental disasters in recorded history."<sup>38</sup> UNEP official Michael Gwynne compared the oil fires to Chernobyl, a disaster "unique in the history of the world."<sup>39</sup> In the words of one eyewitness account:

At the northern edge of Kuwait's Bergan oil field, the second-largest in the world, the air throbs with the thrust of explosive heat, as if hundreds of oven broilers the size of the Empire State Building were on fire. The overpowering stench of burning oil turns the stomach. Greasy black soot soon coats eyeglasses, collects on surgical masks used to protect the lungs, clings to the skin and soils clothing.<sup>40</sup> "The scene amid the burning wells is other-worldly," the New York Times reported. "Huge areas of the land are blackened, some covered with thick crusts of partly cooked oil. The heat of the giant blowtorches can be felt even through the closed window on an automobile rushing past."<sup>41</sup>

"Ecological disasters, such as this oil spill arising from this war in the Gulf region and on our planet should be seriously reflected upon," Dr. Mostafa Tolba, Executive Director of the United Nations Environment Programme (UNEP), said on 28

January.<sup>42</sup> But a whole series of intentional and unintentional oil spills remain largely unattended in the Gulf, even months after they were first detected. The magnitude of the spills at first seemed to be record setting, but their size was eventually pegged at about 2.5-3 million barrels, in the same neighborhood as the 1979 Ixtoc I blowout in the Gulf of Mexico, the world's worst in history, where 3.3 million barrels were released. And even this number continues to be under review, with new estimates coming in of a volume of 4 million barrels, and oil continuing to leak into the Gulf.<sup>43</sup>

This is not the first time that war has polluted the Gulf in this manner, and nor is it the first time that warfare and politics has stood in the way of an expeditious response effort. Even before the present war, the Gulf was one of the most polluted bodies of sea water in the world, both as a result of the intense oil exploitation in peacetime, and the hundreds of tankers and oil terminals that were attacked during the Iran-Iraq war.<sup>44</sup>

In 1983, during the Iran-Iraq war, three wells were ruptured in the Nowruz oil field off the coast of Iran, and some 1.9 million barrels of oil was spilled. Then, as now, the shores of southerly Gulf states, including desalination plants, came under serious threat. And then, as now, much of the oil was never recovered. According to the Washington Post, "Persian Gulf beaches are still covered with hard asphalt mats -- the equivalent of thousands of barrels of oil -- from spills a decade old."<sup>45</sup> In the words of one report, "It is assumed, but not known for certain, that the oil slick released from the Nowruz platform during the Iran-Iraq war in 1983 ended up in deep water in the central Gulf. But its ecological impact is still largely unknown."<sup>46</sup>

Nor did environmental damage stop with the ceasefire on 28 February. In addition to the more obvious effects of the oil spills and fires, there are fears that the intense military activities, and extensive pollution, will do irreparable harm to the desert ecology of the region. "The amount of toxic materials released from refinery fires and bombing is unknown," the Congressional Research Service stated in March, "but damage to the desert ecology and groundwater sources from the massive operations is apparent."<sup>47</sup>

Off-road vehicles -- tanks, armored personnel carriers, trucks, and artillery -- destroy vegetation and disrupt the soil surface, "with highly detrimental effects on the

local ecosystem."<sup>48</sup> Large scale entrenchments and fortifications, the effects of bombardment and pollution, and now the uncontrolled gushing of Kuwaiti oil wells will have a serious impact. The effects of such disruption on desert habitats may persist for decades. In the Cargo Muchacho Mountains of California, for instance, tank tracks are still visible from the training maneuvers of General Patton's troops during the Second World War.<sup>49</sup>

### **Physical Destruction in Iraq and Kuwait**

The final effects of the Gulf War on the man-made environment are still largely unknown. More than 300 "strategic targets" were hit in Iraq and Kuwait, and these included a wide variety of dual-purpose, or even exclusively civilian installations, such as electrical power generation facilities, oil storage and refining centers, communications, transportation, and industrial research and development facilities. There have been a number of reports of facilities such as water distribution and treatment plants, sewage-related facilities, and hospitals, being hit in the war as well. It is assumed that these strikes -- if they occurred -- were the result of "collateral damage."

A number of controversial issues regarding damage to Iraq's infrastructure arose during the war, particularly over the bombing of civilian or installations of questionable military use. There are serious questions relating to the propriety and military need of air attacks on such facilities.

The bombing of the 'Baby Milk Formula' factory first came to light on 22 January. On examination of the evidence that has emerged, it can only be concluded that a mistake was made by US intelligence regarding Iraq's possession of biological weapons, and perhaps Iraq's entire biological research program. The factory was undoubtedly identified, together with nine other facilities, as being a biological warfare facility, but the post-war evidence doesn't seem to support such a conclusion.

The bombing of the Amiriya civil defense shelter on 13 February is also highly controversial. Again evidence indicates a failure of US intelligence, because of the more than 400 civilians who died at the shelter. The conclusion is that the attack was probably part of a late-war campaign to kill the top leadership of the Iraqi government, and

probably Saddam Hussein. There is enough information available now to indicate that the last two to three weeks of the air war included an aggressive effort to kill Saddam Hussein, after it became evident that he was not going to be deposed by the Iraqi people.

In the case of attacks on the nuclear reactors at Tuwaitha, the US military left the impression, and Gen. Schwarzkopf even asserted, that only smart weapons had been used in attacks. After the war, nonetheless, Aviation Week & Space Technology reported a massive and disorderly dumb bomb raid was first attempted against the nuclear facility, increasing the risk of radioactive contamination. It was only after the attack was unsuccessful, that stealth fighters with laser-guided weapons were brought in for a second strike.

The allies seemed to work down a list of suitable pre-set targets, regardless of the state of Iraqi forces in the south. Bridges, for example, not normally controversial military targets, were attacked throughout the country. But most were hit as a secondary priority when there was surplus bombing capacity due to the aborting of primary attacks. Yet after the war was over, Gen. McPeak admitted that the only reason that all of the bridges had not been downed was that the war just didn't last long enough.

Even as the ground war loomed, the strategic bombardment effort methodically and mechanically moved down a list of installations: hitting more bridges, damaging Iraq's airfields (long after the air force has ceased to be any military threat); continuing to pummel industrial plants; and striking civil communications and command facilities. Although Iraqi forces were already isolated in the south, the destruction north of the theater continued apace, even during the frantic efforts of the Soviet Union to forestall ground fighting.

It also seems that by the time the ground fighting was initiated on 24 February, Iraqi troops had no exit, little time, nor adequate communication to allow for proper surrender in the field. Allied ground forces moved forward and killed enormous numbers of soldiers who had emerged from the safety of their fortifications and bunkers. The massacres at al-Mutlaa ridge and the "highway to hell," along 60 miles of roads from Kuwait City to al Jahra, and from al Jahra to the Iraqi border, ultimately resulted in the

death of as many as 25,000 troops. The day after the ceasefire, another Iraqi column attempting to cross the Euphrates river, was also wiped out.

Given the reports of extensive destruction which occurred during the civil war, it is difficult at this point to ascertain the respective responsibility for the destruction in cities such as Karbala, Najaf, or Basra. In numerous Iraqi cities, including Basra and Baghdad, however, it is clear that allied bombing destroyed the interwoven infrastructures of energy, transportation, and communications. A full accounting is still required.

### **Protection of the Environment and the Laws of War**

The Gulf War is not the first war that challenges the laws of war and the customary rules of international behavior, nor is it the first where the natural environment was destroyed for military benefit or spiteful revenge.<sup>50</sup> It is the first time, however, given the age of television, where the impact of war was available for instant assessment.

There is no doubt that the international community could accuse Iraq of violating the laws of war, as well as virtually all the standards of humanitarian decency, for its treatment of civilians in Kuwait and of prisoners of war, and for its violations of the human rights of its own citizens. The international community could also bring responsible parties to justice for setting Kuwait's oil fields afire, and for deliberately spilling huge amounts of oil into the Persian Gulf. These acts are clearly gross violations of all of the specific and implied environmental and property protections which exist in the laws of war.

In examining allied conduct, the conclusion is that the Gulf War was fought within the limits of the laws of war as they are. Mistakes were made, both of judgement and conduct, and some individual violations probably occurred in the coalition air bombardment, but these are still undocumented. The entire ground offensive, and the brutality of the closing battles, however, where tens of thousands of retreating Iraqi soldiers were killed without a fight, shows a worrying loss of military discipline, as well as an abandonment of the principle of military necessity. Yet it is still unclear whether any



laws of armed conflict were actually violated.

The problem, therefore, may be in the laws themselves. The laws of war, originating in the 19th century, are about humanizing warfare, not abolishing it. Only recently, have attempts been made to really limit war's conduct and expand the number of absolute prohibitions. Fundamentally, the laws insist that the opponents discriminate in war between combatants and non-combatants -- that is, civilians, prisoners, and wounded who must be spared. The law is also about avoiding "unnecessary suffering" to combatants while achieving the military objective. If civilians are threatened in the pursuit of military objectives, the commander is asked to consider whether the deaths and suffering would be "proportional" to the military advantage.

Regarding modern war, and specifically the long reach and lethality of aircraft and missiles demonstrated in this war, the laws of war accept the legitimacy of "strategic" bombing of a nation's "war making and sustaining capacity." In some cases, such as the killing of civilians in the Amiriya shelter in Baghdad; the bombing of the 'Baby Milk Factory' and nine other mistakingly identified biological warfare research laboratories; and the destruction of electricity, oil refining and water distribution and treatment facilities; the question should be asked whether US actions were really necessary in light of the major public objective of the war, liberating Kuwait.

The legitimacy of a full range of military and military-related civilian targets is subjective. Within certain guidelines, attacks on even predominantly civilian targets is allowed, so long as they are proportionate to the military effect. Even critics of US and allied conduct use the argument that certain of these targets were "not legitimate," implying that the legitimacy of an individual target is a matter of interpretation.<sup>51</sup>

Evaluating the just nature of attacks, including the nature of the destruction, ultimately requires comparison with the objectives of the war. The US and its allies expanded the war objectives to include destroying Iraqi military might, as well as its nuclear, chemical, and biological capabilities. To some, this might seem in excess to the stated mission, but these broad objectives were derived from UN Security Council Resolution 678 of 29 November 1990, which authorized "all means necessary" to implement previous UN resolutions, and to "restore peace and security" in the region.

The US took this UN mandate as *carte blanche* to destroy Iraq's military-related industrial and economic capabilities.

Even as the war waned, when Iraqi soldiers retreating from Kuwait were killed en masse in order to "get" their equipment, this mission of eliminating Iraqi military power was justified under the UN mandate. Given the failure of the United Nations to impart any limitations on the conduct of the war, and the complete indifference of any civilian leaders in the Bush Administration in performing any humanitarian or political oversight of the conduct of the war, it cannot be said with any authority therefore that the US military contravened the existing rules, or violated the laws of war.

However, some specific attacks, such as the bombing of Iraqi nuclear facilities, run against the grain of customary international law as expressed by the International Atomic Energy Agency (IAEA), the Geneva Protocols, and common sense. Moreover, nuclear, chemical and biological weapons are covered by arms control treaties that the US has ratified, and normally claims absolute confidence in. The wholesale slaughter of Iraqi ground forces during the last days of the war, also shows weaknesses in the modern standards to avoid unnecessary suffering or disproportionate casualties on the battlefield. Surely the Iraqi leadership contributed to the precarious position of its soldiers, but this should not make these incidents sit any more comfortably in our evaluation of the war.

Despite society's alertness to the world's environmental crisis, and the particular horror of Iraq's destructiveness, "war crimes" preparations do not seem to be moving forward against Saddam Hussein. Indeed, for political reasons, the Bush Administration, and numerous western allied governments, prefer not to accuse Iraq of breaching any convention or legal principle or humanitarian rule, and instead still accuse Saddam Hussein of "environmental terrorism."

Environmental considerations are few in times of war, and even then, protecting the environment is largely incidental to the existing restrictions in the laws of armed conflict. Sadly, the US (and Iraq) rejects the specific environmental protections found in the 1977 Geneva Protocols. Several emerging principles of international environmental law are relevant concerning deliberate or transboundary pollution. Harm to the environment in warfare still remains subordinated to achievement of military purpose.

The fallout from this war demands that new standards be found to provide meaningful protections in the future.

Iraq is being held accountable for its war crimes through reparations, and not through trials. In the end, ordinary Iraqi civilians will pay for the crimes of the leaders, despite repeated assurances that we were not fighting a war against the Iraqi people.

This seems a solution scripted for political caution, and not one particularly suited to strengthen the moral forces in society. The legacy of the Gulf War, therefore, for strengthening or weakening the international law of war is mixed. Some elements of allied behavior advanced the "practice" of states and the customs of war, extra precautions were taken to avoid civilian deaths, attempts were made to encourage mass defections and surrender during the air and ground war. Civilian deaths as at Amiriya were not ultimately defended as "proportional" to the value of the target (as the laws of war allow), perhaps advancing the norms of such protections.

But even when the allies followed the rules against Iraq, when two armies clashed in the desert, the effects were still profound. Here was the "perfect" battlefield, a large open desert, mostly empty of civilians, the best possible location in our increasingly urbanized and dense society for segregating the effects of the war from non-combatants and innocents. Yet given the short duration of the conflict, the impact could not have been more difficult to predict or handle.

What is required, then, is more law or less war, or both. To afford greater protection for society and for the environment, much greater restrictions are required on the freedoms of military action and on the objects of attack. The Gulf War challenges us to update the laws of war to consider the reality: the new intensity and lethality of modern war.

## The War

At 2 A.M. on 2 August 1990, 80,000 Iraqi soldiers of the Republican Guards, together with regular armored troops and special forces, crossed the border with Kuwait and headed south towards Kuwait City, 80 miles away. "In the darkness, the crump of artillery shells and the rattle of machine-gun fire awakened Kuwaitis," Newsweek magazine reported. "They looked out their windows to find Saddam's jets and helicopter gunships buzzing the city. Rockets torched the Dasman Palace of Emir al-Sabah.... Tanks shouldered up to the central bank, the repository of much of Kuwait's cash and gold bullion. Troops assaulted the Ministry of Information, where Kuwaiti state radio and television had their studios. 'Hurry to our aid,' a voice cried over the air. Then the transmitter went dead."<sup>52</sup> By mid-morning, the country was occupied.

With intelligence agencies predicting that Saddam Hussein intended a second invasion of Saudi Arabia, US ground, air and naval forces quickly deployed. Initially, the mission was to protect Saudi Arabia, but within a month, a war plan was being put together to conduct offensive operations to eject Iraq from Kuwait. It called for the largest US deployment of forces since the Second World War, and incorporated 34 nations in providing combat and support forces.

An offensive against the "fourth largest army in the world" demanded intense and decisive destruction of the enemy, and the application of overwhelming force. Thus the largest number of aircraft collected together since the Second World War was sent to the Middle East. Within just 35 days of the August invasion, the US already had an aircraft fighter force deployed in the region that equalled Iraq's 1,000-plane capability.<sup>53</sup> Air power would be the centerpiece of the allied battle plan.

Central responsibility and authority for the direction of military operations was given over to the field commander, Army Gen. H. Norman Schwarzkopf, commander-in-chief of the US Central Command. Gen. Schwarzkopf was eventually given full authority to design and implement an offensive against Iraq. "By the middle of October, early November," Gen. Schwarzkopf said, "we had a completely robust strategic air campaign that was very executable right down to a gnat's eyelash."<sup>54</sup>

The plan was made up of four phases, to be executed in sequence, although simultaneous overlap was eventually afforded by a significant increase in the availability of bombing aircraft.<sup>55</sup> Phase one, the "air superiority" phase, would last about a week to ten days, and would aim to disrupt "leadership" command and control (military and civil leadership), destroy Iraqi centralized air defenses, attack aircraft in the air and on the ground, and damage nuclear, biological, and chemical storage and production capabilities.<sup>56</sup> Phase two, to last only a day or two, would "suppress surface-to-air defenses in the Kuwaiti theater of operations" (southern Iraq and Kuwait). Phase three, the longest phase, was timed to last from the end of the first week until the end of the first month, and planned aerial attacks on the field army in Kuwait -- "preparation of the battlefield" for ground operations to reoccupy the country. Phase four, what we now know as the ground war, would consist of joint air and ground operations to defeat the Iraqi army.

### **War Objectives**

The objective of the plan was to "seize the initiative" and paralyze the Iraqi military. "We flew as many combat missions in one day as he [Saddam Hussein] experienced in eight years of war with Iran," Air Force Lt. Gen. Charles ("Chuck") Horner, chief of Central Command's air forces, told the New York Times.<sup>57</sup> In order to maximize the effect of bombardment, Gen. Schwarzkopf "altered the previous Central Command concept of air operations to create a single joint Air Force component commander [Lt. Gen. Horner] who wrote a single air tasking order from which all air forces operated."<sup>58</sup> Thus some 2,800 attack and combat aircraft were used in unison, a significant innovation yielding results that were unexpected, even to military planners.

The great intensity of the bombardment sought to accomplish victory with a minimum of US and allied casualties. "One of the promises I made to the American people was that I would try to achieve the absolute minimum number of casualties on our side," Gen. Schwarzkopf told Life Magazine. "But don't think I didn't stop and think a couple of times, 'Hey, Schwarzkopf, you may not be able to deliver.' But minimum casualties was my intention all along. And we did it."<sup>59</sup>

Given the priority of diminishing Iraq's capacity to inflict allied casualties, destruction of bombing capabilities and SCUD missiles, believed to be Iraq's long-range delivery platforms for chemical weapons, dominated. Soon, with nullification of the Iraqi air force, artillery became the only means for delivering Iraqi chemical weapons, and they then became the priority for attack.<sup>60</sup> "We destroyed their artillery; we went after their artillery big-time," Gen. Schwarzkopf explained.<sup>61</sup> In the words of Adm. Dan March, US Navy task force commander in the Gulf, "Certainly, the objective of Gen. Schwarzkopf was to take away those things that could hurt our soldiers and Marines in the field..."<sup>62</sup>

The war plan took as its guidance the achievement of the four-pronged objectives announced by President Bush on 8 August, as well as the implementation of subsequent UN Security Council resolutions:

- the immediate, complete, and unconditional Iraqi withdrawal from Kuwait;
- the restoration of the legitimate government of Kuwait;
- the protection of US citizens abroad; and
- the security and stability of a region vital to US national security.

On 29 November 1990, the Security Council provided what US leaders interpreted as the authority for a wide ranging military campaign, and the justification for destruction of Iraq's complete warmaking capacity. UN Resolution 678 authorized member states to use "all necessary means" after 15 January 1991 to implement past Council resolutions calling for Iraqi withdrawal from Kuwait, and "to restore international peace and security in the area."<sup>63</sup>

In the pursuit of these objectives, the war plan concentrated, in the words of Sec. Cheney "on a carefully planned set of military targets," as well as a process in which all of the targets were chosen in advance.<sup>64</sup> Nullifying Iraq's nuclear and biological capability also became a major objective in November.

### **Targets**

According to retired Gen. Michael Dugan, the Air Force chief of staff that was dismissed in September, and early architect of the air war, "The strategic plan started with about 100 key war-making targets and grew to about 300."<sup>65</sup> Gen. Schwarzkopf

stated early on in the air war that some 250 fixed targets in Iraq were being struck, comprising both strictly military facilities, as well as dual-use civilian installations. But it appears that well over 300 discrete targets were ultimately the objects of attack.

The military targets included:

- 29 targets of the "state of the art" air defense and early warning system,<sup>66</sup> including radars, both fixed and mobile units, and hardened air defense regional and sector operations centers providing fighter defense direction;
- military command and control facilities, headquarters, and military commands and ministries;<sup>67</sup>
- 66 airfields and 594 aircraft shelters, as well as air maintenance and combat facilities;<sup>68</sup>
- SCUD missile launchers, including 30 fixed sites and some 100 mobile launchers, storage magazines, missile production facilities, and support facilities;
- military production facilities, including ammunition and bomb factories, and repair parts production;<sup>69</sup>
- military goods distribution and storage centers, including fuel storage and distribution centers;
- 31 nuclear, chemical and biological weapons facilities, three nuclear, 18 chemical, and 10 biological; comprised of 11 chemical/biological storage areas of "hundreds of bunkers," and three chemical production facilities;<sup>70</sup> and
- major army and naval bases and facilities, and field military emplacements, including 125 storage revetments for ammunition, FROG missile sites, and Silkworm anti-ship missile sites.<sup>71</sup>

Targets in the civil infrastructure included:

- 54 railroad and highway bridges;<sup>72</sup>
- electrical power production centers, including "the central power system" within Baghdad;<sup>73</sup>
- telephone and telecommunications centers, "main communications nodes," and Iraqi television and radio transmission stations;<sup>74</sup>
- oil production, petroleum refining, and petroleum distribution centers;<sup>75</sup> and

- 26 targets of the "internal state control mechanisms" or the so-called "leadership" infrastructure.<sup>76</sup>

As the war progressed, aircraft made their way down the target list, methodically destroying facilities, large and small. Gen. Powell told USA Today that Baghdad was bombed up to the end of the war: "We continued to find targets there worth bombing. They had a very resilient, redundant communications system. I called it the spinal column of this animal and the brain stem. It was a very target-rich environment."<sup>77</sup>

### **The Air War**

At 3 A.M. local time on 17 January (7 P.M. EST on 16 January), 668 attack aircraft, with supporting planes from seven nations, began what has been described as "the most intensive bombing campaign in history."<sup>78</sup> Within 14 hours, 1,000 combat sorties had been flown, and over 100 Tomahawk sea-launched cruise missiles had been fired against land targets. The initial attacks were against a broad spectrum of military and civilian facilities in Iraq and Kuwait -- 75 targets the first night on Iraqi territory. The priority was the communications and decision-making structure of the Iraqi government and military.<sup>79</sup>

Targets in the cities of Baghdad, Basra, and probably Mosul, were hit from the very first night. The Air Force assessed that "Baghdad was more heavily defended than the most highly defended Warsaw Pact sites in Eastern Europe during the height of the Cold War."<sup>80</sup> Aircraft flew against some 3,000 anti-aircraft guns and 60 surface-to-air missile batteries protecting the city.<sup>81</sup> The city of Basra was equally well defended, and was described as "the center of gravity" for Iraqi forces.

The first night's attack was, according to Gen. "Tony" McPeak, Air Force chief of staff, "a very heavy attack, very precisely delivered." Tomahawk sea-launched cruise missiles and F-117A stealth fighters delivering smart weapons "did all the work in the heavily-defended downtown Baghdad area" and "attacked key parts of the air defense system throughout Iraq," including air defense operations centers and command and control nodes. Once the air defense system was disabled, "other strike packages rushed through, and we hit very hard -- this was a massive attack in the very beginning moments



of the war" Gen. McPeak said.<sup>82</sup>

On 18 January, the Pentagon announced that some 2,000 air sorties would be flown daily during the initial phase of the campaign. Bad weather soon interfered with the pace of operations -- "the poorest weather in 14 years in the Baghdad and Kuwait area," Gen. McPeak said -- and a number of daylight missions, as well as an effective bomb damage reconnaissance effort, were impeded.<sup>83</sup>

From the very beginning of the air war, attacks were split between "strategic" targets and military forces in Kuwait and southern Iraq.<sup>84</sup> Gen. McPeak stated that because the US "had more than enough air power on the scene to do the phase one job at the beginning [attainment of air superiority]...we simply diverted it to begin on phase three [attacking the army in Kuwait]. So there was no time from day one on, that the Iraqi ground forces were not under heavy air attack."<sup>85</sup>

#### **Increasing the Intensity of the Air War**

Soon after initiation of the already unprecedented air attack, the intensity of the air war was increased, still for reasons not fully clear. Over the six weeks of the air war, intensity of bombing would be even further increased.

"After the opening of combat operations," Gen. McPeak stated, "some of our coalition partners agreed to allow us to conduct operations," resulting in an increase in the number of bombing aircraft. About 100 F-15E, F-111, and F-16 fighter-bombers started flying missions from Turkey starting on 20 January.<sup>86</sup> Twice, Gen. Schwarzkopf asked for the number of his B-52 bombing assets to be increased, and twice the number of bombers available to the war effort was increased.<sup>87</sup> French air force aircraft took up bombing missions against targets in Iraq on 24 January, reversing a previous French government restriction of bombing targets only in occupied Kuwait.<sup>88</sup>

In addition, after the air war began, the number of attack aircraft already involved in bombing efforts was increased. The number of F-117 stealth fighters was increased in late January with the addition of aircraft from a stateside training squadron, which deployed from Nevada.<sup>89</sup> Marine Corps AV-8B Harrier II jump jets, initially held in reserve as division level assets to conduct close air support missions, were added to the bombing operations.<sup>90</sup> According to the Air Force, "modifications were accomplished

to expand weapon system delivery on the B-52" during the war, allowing the bombers to carry more weapons.<sup>91</sup>

Once air superiority was achieved, air defense fighters and anti-submarine aircraft were also added to the bombing effort. The air defense planes, which normally carry air-to-air missiles to shoot down enemy aircraft, were loaded with bombs so that pilots returning from air patrols over Baghdad and the north could bomb "targets of opportunity" they spotted on their way back to base.<sup>92</sup> According to the Washington Post, "Saudi fighter pilots, expressing boredom with escort duty and air patrols against an Iraqi air force that will not challenge them, have replaced some of their air-to-air missiles with Mavericks and have gone hunting for ground targets."<sup>93</sup> US Navy F-14 Tomcat interceptors were reported going "deep in-country to strike major targets."<sup>94</sup> Eventually, S-3 Viking anti-submarine warfare patrol planes joined the bombing campaign on land, and were loaded with cluster bombs to strike ground forces in the closing days of the war.<sup>95</sup> As the number of aircraft involved in ground attacks increased, the proportion of aircraft involved in bombing shifted from some 50 percent to 75 percent or more on some days.<sup>96</sup>

#### **Air Defeat**

The effect of the air war was immediate and devastating. Commenting on the deployment of Iraqi forces at outset of the war, and the rigidity of Iraqi defenses, Gen. Schwarzkopf said, "the day we executed the air campaign, I said, 'We gotcha.'"<sup>97</sup> With intense attacks on airfields and air defenses, Iraqi aircraft were quickly dispersed and moved north, and the western and southern air defenses were immediately weakened.<sup>98</sup> On 20 January, Gen. Schwarzkopf stated that lines of supply to Iraqi forces had been disrupted, with A-10 Warthog and F-15E Strike Eagle aircraft performing "road interdiction."<sup>99</sup>

One week into the war, coalition air forces had flown over 15,000 sorties, with some 8,000 being combat sorties. Iraqi ground forces did little. On 23 January, Gen. Powell described "over 120 brigades and some 30-plus divisions dug in" in Kuwait and southern Iraq, and said that "there has been no major, in fact there have been no minor shifts of units around."<sup>100</sup> The search for mobile SCUD missiles was taking

considerably more resources than had been planned, and the weather continued to dog the bombing effort, but everything else was going the allies' way.

Shelter busting operations at Iraqi airfields began on 25 January, with laser-guided bombs being employed to destroy individual hardened "hangarettes" holding Iraqi aircraft. Almost immediately thereafter, Iraqi planes began fleeing to Iran. On 27 January, Gen. Schwarzkopf stated that the US was successfully attacking key bridges leading south, and that the campaign against the Republican Guard was "highly successful -- just based upon the delivery methods and the volume that we've been able to put on them."<sup>101</sup>

Iraqi forces made a number of probes into Saudi Arabia in the last week of January, which some interpreted as an attempt to draw allied ground forces across the border, and theoretically into greater carnage. But nothing such occurred, and in a couple of days, Saudi territory was again secured, and hundreds of Iraqi prisoners were taken. All the while, the air war continued, and on 30 January, the US military declared complete "air supremacy."

After 14 days of the air war, with 30,000 air sorties flown, Gen. Schwarzkopf reported on the effects of the bombardment:<sup>102</sup>

- 29 targets of the air defense "nerve" system had been attacked with more than 800 sorties, forcing Iraq to abandon centralized control of air defenses;

- 38 airfields had been attacked with 1,300 sorties, with at least nine airfields inoperative and more than 70 hardened shelters destroyed;

- all 30 fixed SCUD missile facilities and all major missile production facilities had been destroyed, and some mobile SCUD launchers had been destroyed, in 1,500 sorties;

- 26 leadership targets had been struck with 60 percent "severely damaged or destroyed;"

- 75 percent of Iraq's command, control and communications facilities had been struck, with one-third "destroyed or inoperative;"

- 31 nuclear, chemical and biological facilities had been attacked in over 535 sorties, with all nuclear facilities destroyed, 11 chemical and biological storage areas

destroyed, and three biological and chemical production facilities heavily damaged or destroyed;

- power plants had been attacked, and "one-fourth of Iraq's electrical generating facilities are completely inoperative," with another 50 percent suffering "degraded operations;" and

- 33 of 36 "targeted" bridges had been bombed in over 790 sorties.

Gen. Schwarzkopf also stated that the Republican Guards in the Kuwaiti theater had been targeted with about 300 sorties daily. Some 6,000 of the estimated 15,000 combat sorties to date could be accounted for as having engaged specific strategic targets, with another 4,000 having engaged military forces in the field. Another 1,000-plus sorties had been directed against SCUD missile launchers.

On 2 February, fighter-bomber and attack aircraft were given areas to patrol on the battlefield, as they searched out "targets of opportunity," such as tanks and bunkers, or convoys on the roads. Also in the first week of February, A-6s, F-15s, F-16s, and B-52s started targeting Republican Guard fortifications every three hours around the clock, and more and more of the bombing effort shifted to the mission of isolating and disrupting troops in the Kuwait theater. The momentum of destruction of Iraqi forces, particularly armor and artillery, increased, as 25 percent of the sorties were directed against front-line and second-echelon ground forces on the Saudi border (not the Republican Guards, who were deployed in Iraq). Five to ten percent of the bombing effort continued to be against mobile SCUD missile launchers and their support infrastructure. On 5 February, the battleship USS Missouri used its 16-inch guns for the first time, firing its 1.25 ton projectiles into Kuwait. The battleship USS Wisconsin joined the attack of 7 February.

Strategic attacks on the general war infrastructure of Iraq continued through the end of the air war. As Rear Adm. Mike McConnell of the JCS stated on 1 February, the "overall objective" is to "degrade the warfighting infrastructure in the country, to eliminate the ability to wage war." As the bombing continued, the issues of civilian casualties and collateral damage became more prominent. The bombing of an infant formula factory around 22 January sparked the debate, and soon stories emerged about

the bombing of Basra, the bombing of bridges in downtown Baghdad, and bombing of the road to Jordan. On 13 February, concerns about civilian deaths reached a peak when news reached the west of the bombing of a shelter in the Amiriya section of Baghdad, in which some 400 civilians eventually lost their lives.

At the end of the first month of the air war, the Pentagon doubled its previous estimate of destroyed Iraqi tanks, adding that one third of the artillery in the southern theater had been destroyed. Over 70,000 sorties had been successful attriting Iraqi military equipment, but the air war also served to devastate the morale of Iraqi soldiers. Ninety percent of the supply stream from Iraq to its forces in the south had been eliminated. As the sixth week closed, it became clear that the ground assault was imminent, an assault which hesitated during the frantic peace efforts of the Soviet Union, but then uncoiled with the same ferocity of the air campaign.

### **The Ground War**

According to Newsweek, Gen. Schwarzkopf made preparations for a ground war knowing that political considerations were driving the final phase of Operation Desert Storm: "Part of the problem was tactical, part political. At the back of his mind he wondered, 'How long would the world stand by and watch the United States pound the living hell out of Iraq without saying, 'Wait a minute -- enough is enough.' He itched to send ground troops to finish the job."<sup>103</sup>

Six weeks of aerial bombardment left poorly supplied, demoralized, and frightened Iraqi forces, with combat units significantly attrited and high casualties and desertion rates.<sup>104</sup> "Forty-two days of bombing were enough to take the starch out of anyone who wasn't that motivated to begin with," one ground commander said. "Quite simply," a pool reporter observed at the beginning of ground fighting, "all the fight had already been taken out of them" -- "the items the Iraqis left behind in their hasty surrender painted a wretched picture of ill-fed men living in dank holes in the ground, growing more dispirited by the day as the chill and their own hunger grew ever stronger."<sup>105</sup>

Allied ground forces crossed the Iraqi and Kuwaiti borders in large numbers on

24 February. But the 43 Iraqi divisions and the often-quoted "half a million Iraqi soldiers"<sup>106</sup> just folded. The 14 front-line infantry divisions had been pummeled to the point they were estimated to be at less than half their combat strength of six weeks earlier.<sup>107</sup> Iraqi artillery fire was sporadic and ineffective; the vast majority of units were unable to fight coherently.

A Newsweek pool reporter with the Army's 2nd Armored Division "Tiger" Brigade attached to the 2nd Marines described the scene in Kuwait this way: "Most Iraqis just gave up -- or tried to. It was a bizarre scene. The advance was like a giant hunt. The Iraqis were driven ahead of us like animals...[Iraqi soldiers] looked like spectators caught on a demolition-derby circuit."<sup>108</sup> According to another pool reporter, "With Iraqi units forced at last from the safety of their bunkers, soldiers and commanders alike described every battle as a 'feeding frenzy.'"<sup>109</sup>

Although there were pockets of shooting by disorganized troops, in the end Iraqi soldiers offered little or no resistance and surrendered by the tens of thousands as US and allied forces advanced. A pool reporter with the 101st Airborne Division wrote that "Since Tuesday, US soldiers have been attacking fleeing enemy troops..."<sup>110</sup> Another pool reporter with the 82nd Airborne Division far west in the town of As Salman in southern Iraq wrote that Iraqi soldiers in the town had fled only two days earlier. "They knew we were coming," an Army officer said.<sup>111</sup>

"What has surprised some of the officers within the [24th infantry] division," another pool reporter wrote, "is the lack of spirit and the apparent absence of command and control among the Republican Guard units..."<sup>112</sup> The US 1st Armored Division, attacking an Iraqi military training camp near al Bussaiya in southern Iraq found the facility "had been deserted, as its defenders fled into the desert and then turned themselves over to American troops."<sup>113</sup> As the US 1st Armored Division moved north, "Iraqi soldiers were caught by surprise, in some case having removed the batteries from their vehicles to cook dinner and light their bunkers."<sup>114</sup> Lt. Gen. Kelly said on 27 February that, "I don't think it's nearly the fight that we thought it would be."<sup>115</sup>

As allied forces approached the outskirts of Kuwait City, they found a city that had also been abandoned by Iraqi forces. A pool reporter with the 1st Marine Division

wrote that, "Much of the Iraqi forces had surrendered or retreated long before the Marines reached the city. Except for one brief tank battle in which a dozen Iraqi vehicles were destroyed, there appeared to be little organized resistance."<sup>116</sup> Iraqi forces had started leaving on Sunday 24 February; by Tuesday night, the city had been abandoned.<sup>117</sup> They left behind "evidence of a disorganized army in fearful flight" -- tanks, artillery, trucks, anti-aircraft guns, anti-tank missiles, and rifles and machine guns throughout the city.<sup>118</sup>

Facing a ragged army, US and allied forces had to balance their additional mission of destroying Iraqi military equipment, with the responsibility of allowing forces to surrender. Maj. Gen. William Keys, commander of the 2nd Marine Division, said on 26 February that Marines "won't shoot anybody who wants to surrender. But we want to stop as many of them from retreating as possible and destroy as much enemy equipment as possible. We want to try to stop the withdrawal."<sup>119</sup> Army Col. John Sylvester, commander of the "Tiger" brigade, said that "we don't want to kill unless we have to."<sup>120</sup>

Yet as ground forces moved forward, one officer said that "the noose has been tightened" around the Iraqi force so effectively, "escape is impossible."<sup>121</sup> A senior US general described the pursuit of retreating forces as a "slap and hug," encouraging surrenders by intensely bombarding ground forces, then pausing long enough to broadcast appeals for soldiers to give themselves up.<sup>122</sup> As a pool reporter told the story, one soldier reported to his commander Iraqi vehicles "who look as if they're trying to surrender." The commander replied, "If they don't get out quickly, you gotta kill them."<sup>123</sup> Vice Adm. Stanley Arthur, naval commander in the Gulf, and coordinator of the intense naval air strikes on forces in the theater, told a pool reporter on 27 February that if the Iraqis don't surrender, "I think we will destroy every piece of equipment that he has if we can get our hands on it."<sup>124</sup>

As the end of the war neared, much of the earlier speculation about the removal of Saddam Hussein got subsumed in the momentum of an otherwise stunning success. Ground operations took on a momentum of their own, and whatever thoughts might have existed about the occupation of Iraq in the face of military defeat went by the

wayside. On Wednesday afternoon, 27 February, Gen. Powell reportedly told President Bush that "By tonight, there won't really be an enemy there," recommending that the fighting stop. "If you go on another day," Powell is quoted as saying in Newsweek, "you're basically just fighting stragglers."<sup>125</sup> Bush approved the temporary ceasefire.

At 7:00 AM on Friday, 1 March, six weeks after the allied air attacks began, and 100 hours after the ground campaign was initiated, the 1,100 hour war ended. The rapid pace of the operation, the disintegration of Iraqi troops, and the overwhelming superiority of allied forces ultimately turned the "ground war" into an allied chase, and introduced the era of "hyper war."

### **The Civil War**

Immediately after the ceasefire, refugees fleeing Iraq brought stories of spontaneous and disorganized clashes between troops and civilians in numerous cities and towns in southeastern Iraq. Starting on 2 March, retreating troops and loyalist Iraqi forces, deserters and stragglers, insurgents, and civilians were reported fighting in a near anarchic struggle. Much of the fighting was attributed to Shiite uprisings against Saddam Hussein's government, but soon enough, there were reports of a Kurdish rebellion in the north (more than half of Iraq's 18.8 million population are Shiites, and a quarter are Kurds.)

The city of Basra, Iraq's second largest, was at the center of the civil war in the south. Large scale demonstrations and much violence was reported, with large amounts of abandoned military equipment available to rebel forces.<sup>126</sup> Civilians were reported taking over and attacking government buildings, as well as releasing large numbers of prisoners.<sup>127</sup> The Mayor and the provincial governor were reported killed.<sup>128</sup> There were reports of executions of young Shiite Muslim males by Iraqi military forces, the shelling of civilians, and instances where civilians were gunned down by attack helicopters.

By late March, bloody fighting had spread to over two dozen cities and towns.<sup>129</sup> Significant additional damage was done to the civil infrastructure. "In Baghdad," the New York Times reported 19 March, "newspaper and television reports in recent days



have shown vivid scenes of destruction in several cities as a result of the civil war. Reports quoted today by the Iraqi press agency said saboteurs and rioters in Karbala and nearby towns had looted hospitals and schools, burned cars and killed children and women 'by decapitating them.'<sup>130</sup>

The holy sites of Karbala and Najaf, avoided by the smart bombs of the allies, and havens for Iraqis fleeing Baghdad during the air war, were particularly hard hit in the first two weeks of March. Damage was reported done to the Hussein and Abbas mosques in Karbala, a report that was verified by US reconnaissance.<sup>131</sup> At a news conference in Baghdad on 20 March, the minister of trade reported that in the civil unrest, silos of grain and other stores of food "were destroyed, burned or looted" in southern Iraq and Kurdistan.<sup>132</sup>

By the last week of March, Saddam's forces had regained control in the south, and were reportedly engaged in "fierce reprisals" against insurgents and suspected sympathizers.<sup>133</sup> Coincident with the uprisings in the south, Kurdish rebels moved against Saddam's government in villages and towns in the north.<sup>134</sup> Fighting brewed at a low level for some two weeks, until late March, when over 100,000 Republican Guards arrived in the Kurdish region. Cities that had been taken back from the Kurds were quickly emptied of people. Sulaimaniya appeared like a ghost town.<sup>135</sup>

Routes to Syria were effectively blocked off, and the Kurds had very little choice but to go through the mountains to the north and east. "The hospitals we visited had no more medication. The medical personnel had to use rags to sponge off hemorrhages. It was impossible to evacuate the wounded to other hospitals in the region because the road had been severely bombed. We tried twice to leave Iraq and saw thousands of people whose only alternative was to escape through the mountains," a medical team reported.<sup>136</sup>

Iraqi military forces launched artillery and helicopter gunship attacks and reprisals on Kurdish civilians.<sup>137</sup> Heavy fighting was reportedly centered on Kirkuk, which at one point was under complete rebel control.<sup>138</sup> By early April, Iraqi forces had reoccupied the last provincial capital, and, according to the US Defense Department, there was "minimum offensive activity by the insurgents anywhere in the country."<sup>139</sup>

Reports started coming in of the movement of tens of thousands of refugees fleeing the towns and cities, heading for the Turkish and Iranian borders.<sup>140</sup> By 4 April, the US estimated that approximately 17,000 refugees had crossed into Turkey.<sup>141</sup> Soon, tens of thousands had become hundreds of thousands, and then millions. "People are fleeing their own government -- a government which is shooting them in the back," International Rescue Committee Executive Director Robert P. DeVecchi said. "Not since Pol Pot's Khmer Rouge have we witnessed such despicable acts by a government against its own people."



## The Human Cost of The War

Despite the low number of US and allied deaths in the war against Iraq, the effect of the war on the Iraqi people, on Kuwaitis, and on other people in the region and farther afield, was significant. The human effects hardly ended with the ceasefire. All of the casualty estimates of governments and of relief agencies before the war ended up being too low.<sup>142</sup> The long-term effects of the Gulf War in human terms may never truly be counted.

Hundreds of thousands of Kuwaiti citizens and third country nationals fled the country after the occupation, well over one million third country nationals fled Iraq, and millions of Iraqis eventually sought refuge away from their homes after the civil war. In January and February alone, as many as 500,000 Baghdad residents were estimated to have moved to other towns or to rural areas to escape allied bombing.<sup>143</sup> With the civil war, some 2.5 million Kurds, Shiites, and other Iraqi citizens sought refuge away from the Iraqi military in the mountains of northern Iraq, in Iran, and in Turkey.<sup>144</sup>

Thus since August, over six million people have become refugees at some point during the embargo period, the war, or its aftermath. Over one-third of the pre-war population of Iraq is believed to have been dislocated by the war; at least two thirds of the pre-occupation population of Kuwait is scattered throughout the world.<sup>145</sup> At the end of April, well over two million Iraqis, mostly Kurds, and an additional two million third-country nationals,<sup>146</sup> together with tens of thousands of Shiite refugees, remain dislocated from their original homes or country of domicile, living without adequate support systems, in makeshift refugees camps in the demilitarized zone, in Jordan, Saudi Arabia, Kuwait, Iran, Syria, or Turkey.

"This may be perhaps the largest movement in the shortest amount of time in modern history," Neil Frame, health resource director of Operation USA, said in an interview. Entire populations have moved. With inadequate relief agency (and military) resources, and with significantly disrupted civil services in Iraq, the effects of the movement -- and the loss of life -- continues to mount.

It is estimated that 100,000-120,000 Iraqi military personnel, 5,000-15,000 Iraqi

civilians, and 2,000-5,000 Kuwaitis died in the course of the occupation, the air war, and the ground war. Some 350 allied soldiers also died. The month-long civil war is estimated to have taken the lives of 20,000 additional Iraqis. Conservative estimates are that another 15,000-30,000 Kurds and other displaced people have died in refugee camps, on the roads, and in the mountains, through the beginning of May. It is also estimated, according to information derived from interviews with relief workers and US government analysts, that 4,000-6,000 Iraqi civilians have died since the end of the war due to disease, inadequate medical attention, or malnutrition.

To summarize, 100,000-120,000 Iraqi soldiers lost their lives in the war, as many as half of them during the 100 hours of ground fighting. From 49,000-76,000 Iraqi civilians have died, about 10-20 percent directly from allied bombardment and attacks, and the remaining 80-90 percent since the ceasefire. Altogether, from 151,000-183,000 people died from August to the beginning of May.

Many factors affected the loss of life. Even what many anti-war advocates were calling for prior to the war -- enforcement of the embargo -- took its toll. On 4 December 1990, Iraq's Health Minister announced, for instance, that 1,416 children under the age of five had died in the past four months because of the embargo.<sup>147</sup> By February, Iraq claimed that the death toll had risen to some 5,000 civilians, mostly due to the lack of medicine.

The refugee death toll is particularly difficult to count. Physicians for Human Rights estimated that as many as 1,000 people a day alone were dying in April along the Iraqi-Turkey border; in May, the United Nations increased the estimate to 2,000 people daily. The Iranian Red Crescent reported that in mid-April, the death toll had reached 1,000 in Iran, and hundreds more were reportedly dying daily in early May. As many as 3,000 Iraqi refugees a day overall were estimated to be dying at the beginning of May, according to a US State Department relief specialist.

As the summer temperatures climb, and refugees continue to live without adequate sanitation, nutrition, or health care, the death toll may accelerate even higher. It will be several months until the civil infrastructure, everything from immunizations to schools, are back in place, and as problems are solved others occur. "In our view the

effect of the war has been to create in Iraq a situation of impending crisis for the civilian population," a Save the Children report states. Children, an estimated 40 percent of the refugee population, are especially at risk. "Three million under-five children are at risk as a cycle of diarrhoeal episodes and reduced calorie intake clears the way for a major human disaster," a UNICEF report at the end of March stated.<sup>148</sup>

The effects reach beyond Iraq, Kuwait, and its neighbors. A number of additional Arab, African, and Asian countries have also been affected by the war, as a two million strong emigre worker population (including families) found itself displaced by the occupation and the war. Their return to mostly developing countries, as well as the loss of their revenues, puts additional pressure on already overburdened economies and relief organizations.

### **Iraqi Military Casualties**

US and allied military officers reportedly estimated in early January that 100,000-120,000 Iraqi soldiers would die in the course of a six-week bombing campaign.<sup>149</sup> This estimate proves to be close to the number that most Defense Department analysts familiar with damage assessments in the war believe is likely. On 22 March, the Wall Street Journal stated that 100,000 Iraqi soldiers had died, quoting figures privately provided by Gen. Schwarzkopf and his top officers to Congress.<sup>150</sup> Nonetheless, the estimates quoted in the press have varied widely, from a low of 25,000-50,000 dead, to as many as 200,000.<sup>151</sup>

Much of the dispute which exists over counting Iraqi military casualties is based upon the estimate of the number of forces actually deployed in the Kuwaiti theater at the time of the initiation of the air war, the number of soldiers that managed to leave the area before the ground war commenced, as well as assumptions as to the number of deaths that occurred in the ground war.<sup>152</sup>

There have been numerous reports of the possibility that US and allied intelligence overestimated the number of Iraqi soldiers in the Kuwaiti theater by as much as 50 percent. Prewar estimates, repeated by military briefers, and never corrected during the air war, were that 540,000 Iraqi troops were deployed in southern Iraq and

Kuwait. Lt. Gen. Kelly said after five weeks of the air war that probably only 500,000 Iraqi soldiers remained. But some US military analysts claimed in mid-March that the actual number may have been closer to 250,000-300,000 -- that only 350,000 soldiers were present on 17 January, and only 200,000 remained by the time the ground war started.<sup>153</sup> In an interview with reporters on 22 March, Gen. Powell said that "there were a hell of a lot" fewer Iraqi soldiers than 540,000 in the war zone when the ground war was launched.<sup>154</sup> But an authoritative and accepted estimate is still not available.

By the end of war, the number of Iraqi prisoners of war reached more than 80,000 (and as high as 100,000).<sup>155</sup> It is unknown how many troops had deserted from military units, although intelligence estimates range as high as 30 percent.

The explanation for high levels of casualties, given the lower estimates of troop strength on the battlefield, derives from an analysis of the particular efficiency of the air and ground attacks. The London Times, which has made one of the highest estimates of casualties, reports that "preliminary reports suggest that allied bombing [against ground forces in the Kuwaiti theater] was much deadlier than previously thought and thousands of troops may be buried in bunkers and trenches."<sup>156</sup> According to the Washington Post, "some US officials have cautioned that even a tally of buried bodies will be highly imprecise, because many Iraqi soldiers were dismembered or charred beyond recognition in explosions of deadly US munitions."<sup>157</sup>

When the ground war was over, Gen. Schwarzkopf stated that, "There's a very large number of dead in these units. A very, very large number of dead. We even found them when we went into the units ourselves and found them in the trench lines."<sup>158</sup> Soldier deaths went unrecorded when they were removed and buried by the Iraqis before the ground defeat, or were buried by the Kuwaitis. Iraqi POWs reported that soldiers were buried daily by their comrades following air strikes before the ground war.<sup>159</sup>

It is believed that as many as 50,000 Iraqi soldiers were also killed during the 100-hour ground war. A senior military official in Riyadh told the Los Angeles Times that the allied attacks on the Tawalaina Division of the Republican Guards during the ground war probably killed 10,000 men. "No prisoners were known to have been taken, he said, and no soldiers were seen fleeing the battlefield."<sup>160</sup> One reporter with the US 1st

Armored Division, which spearheaded the VII Corps thrust across southern Iraq, estimated that in its clash with elements of at least five Iraqi divisions, as many as 10,000 Iraqis were killed.<sup>161</sup> One Army analyst familiar with the situation reports submitted by units involved in the attacks on retreating troops estimates that as many as 25,000 Iraqis were killed on the "highway to hell," and in other retreating convoys from al Jahra to Iraq.

At the end of the ground war, the Washington Post quoted "Pentagon officials" as saying that "heaps of Iraqi corpses are being buried in mass graves across the desert..."<sup>162</sup> The Wall Street Journal reported that "allied ground forces used bulldozers to bury thousands of enemy dead in trenches as the allies advanced..."<sup>163</sup>

A US military spokesman stated on 25 March that 49 separate and marked burial sites were being used to inter Iraqi soldiers on the battlefield. Yet on 28 March, US military officials announced that US soldiers had buried only 444 Iraqi soldiers on the battlefield.<sup>164</sup> Defense Department analysts explained the low number of US burials by the fact that most of the battlefield burials were actually performed by Saudi units, although there still seemed to be no precise accounting of the number of soldiers interred.<sup>165</sup> Coalition forces provided an accounting of Iraqi soldiers buried on the battlefield to the International Committee of the Red Cross (ICRC) the week of 25 March, but the number was not made public.<sup>166</sup>

### **Allied Military Casualties**

A total of 343 allied soldiers died, and some 563 were wounded in the six months of the war. The best estimate of allied casualties is as follows:<sup>167</sup>

- The US death toll for the six-month operation was 266, with 122 accidental (non-combat) deaths occurring since the deployment of forces for Desert Shield.<sup>168</sup>

Another 357 US soldiers were wounded in action, six remain missing.

- British casualties total 44 dead, 25 in action, 19 killed in non-combat accidents; 43 British soldiers were wounded in action.

- Two French soldiers died, and 28 were wounded.

- One Italian soldier was killed in a non-combat accident.



- Twenty-nine Saudi soldiers were killed, 53 were wounded, and nine were missing in action.

- Nine Egyptian soldiers were killed, and 74 were wounded.

- Six soldiers from the United Arab Emirates were killed in action.

- Eight Senegalese soldiers were wounded in action.

Iraq released allied POWs starting 4 March, and by 13 March, all 47 allied military prisoners that were held by Iraq were repatriated.<sup>169</sup>

### **Kuwaiti Casualties**

There is still not an accurate or complete account of the number of Kuwaiti deaths suffered during the occupation and the war. Although the Kuwaiti government during its exile claimed that 25,000 citizens were killed or missing, the Associated Press reported on 20 March that "current interviews suggest the figure is a couple of thousand" Kuwaiti citizens killed or still missing.<sup>170</sup> State Department and Defense Department analysts generally agree with this figure.

According to a leaked copy of the "civil affairs" annex to the Desert Storm war plan, the US military estimated in the autumn that up to 40,000 Kuwaiti citizens would be killed in the war, and that another 100,000 would be injured.<sup>171</sup> But two thirds of the population fled Kuwait before the air war began, and the number of deaths proved to be much lower.

Kuwait's ambassador to the UN said on 28 February that Iraq had seized 22,000 Kuwaiti civilians as hostages and held 8,632 Kuwaiti soldiers as prisoners of war.<sup>172</sup> Ultimately, the Kuwaiti government-in-exile gave the ICRC two lists with the names of 14,000 Kuwaiti soldiers and civilians it said were missing, a list that was eventually boiled down to 7,000 names after eliminating double-counting.<sup>173</sup>

On 8 March, Iraq released about 1,000 Kuwaitis who had been taken hostage in the final days of the war. Between 10-17 March, the ICRC registered 4,368 Kuwaiti POWs or civilian internees in Iraq.<sup>174</sup> On 22 April, Kuwait complained to the UN Security Council that Iraq had still not released 5,433 POWs and civilian detainees in accordance with the terms of the ceasefire.<sup>175</sup>

## **Iraqi Civilian Casualties During the War**

Through the first two weeks of the air war, Iraq downplayed the number of civilian casualties, both as a way to maintain civilian moral support, and as a means of denying any success to allied bombing. The numbers of civilian casualties then released varied enormously. On 20 January, Iraq said that 31 military personnel were killed and 51 were injured in air attacks. On 21 January, Iraq's Ambassador to the UN stated on US public television that some 300 civilian casualties had resulted from air attacks. On 28 January, the New York Times reported that Iraq told of 90 military personnel and 125 civilians dead.<sup>176</sup> On 5 February, Iraqi Foreign Minister Tariq Aziz said that 428 Iraqi civilians had been killed and 650 wounded in bombing attacks since the war began. On 6 February, the New York Times reported that 108 Iraqi civilians had been killed and 249 wounded in attacks on residential neighborhoods.<sup>177</sup>

Around the time of the Amiriya shelter bombing of 13 February, as increased international concern was being expressed about the effects of the air war, Iraq seemingly shifted its tack vis a vis civilian casualties, and began to speak of a different human toll. On 1 March, Middle East Economic Digest reported that Iraqi sources estimated civilian casualties during the first four weeks of the air war at 20,000 killed and 60,000 injured. On 6 March, Iraqi sources said 50,000 civilians were killed during the war. A Belgian member of the European parliament said other sources reported between 3,000 and 10,000 Iraqi civilians were killed in the war.<sup>178</sup> In April, the American Friends Service Committee said that a team in Iraq was told by the Red Crescent there that casualties were up to 300,000. "He suggested that we multiply the 150,000 allied sorties by two to reach the 300,000 casualties Red Crescent estimated." The next time the official met with the group he suggested they multiply the number of sorties by five.<sup>179</sup>

During the air war, probably fewer than 3,000 weapons (bombs and cruise missiles) were fired at targets in metropolitan Baghdad, while about double that number is estimated to have been dropped on targets in Basra. Some 1,000-3,000 people are estimated to have been killed in cases of known collateral damage from air attacks in these two cities and other towns. It is estimated that some 5,000-15,000 civilians died in

20,000 sorties flown against strategic targets in the war.

### **Dislocation and Repatriation of Third Country Nationals**

A great movement of civilians was caused by the invasion of Kuwait and the subsequent embargo of Iraq. Estimates now show that up through February, almost two million migrant workers living in those two countries -- 700,000 of those dependents -- left their homes and jobs. From August to October alone, almost one million third country nationals were helped by relief organizations to move into camps outside Iraq and Kuwait, and then to return to their countries of origin. A movement of this size, in that period of time, had "no precedent," the UN Disaster Relief Organization (UNDRO) said. UNDRO describes the unusual refugee and transport situation created by the occupation and embargo, where people had to be moved to "transit camps" and then moved again on planes to their countries of origin:

On the average 7,000 persons were flown out of Amman each day on about 40 flights daily. At the same time, internal transport had to be organized for the daily transport of thousands of evacuees from the border to one of the transit camps, and from there to the airport. In addition, transit camps had to be established, with food and accommodation for a quickly changing population (the average stay in a camp was five days) assembled by nationality, to facilitate airport departures.<sup>180</sup>

Before the invasion of Kuwait, according to the International Labor Organization (ILO), Iraq and Kuwait had an estimated 2.8 million workers from other countries. The ILO estimates that 7.1 per cent of the economically active population of Egypt and 11.6 percent of that of Jordan were migrant workers in the two countries before the August invasion.<sup>181</sup> Estimates are that over two million of these workers and their dependents fled during the occupation period, creating huge resettlement, employment, and financial problems for relief organizations and for their countries of origin.<sup>182</sup> Their departure will have a significant impact on the future productive economies of both countries.<sup>183</sup>

### **Civilian Deaths During the Civil War**

Based upon anecdotal information, it is estimated that some 20,000 Iraqi civilians were killed during the month-long civil war. It is known that the Iraqi military action against rebels and sympathetic civilians was particularly violent and brutal, and many reports indicate that the number could be even significantly higher than this estimate.

Iran's official radio reported that over 16,000 people had died in the two holy cities of Karbala and Najaf in the south during the short-lived uprising.<sup>184</sup> Karbala, it was reported, sustained a "very heavy bombardment,"<sup>185</sup> and hundreds of bodies, some "mutilated beyond identification," were reported on 18 March in the streets of the town, and in nearby Hilla.<sup>186</sup> "Almost a month after the fighting," physicians touring a Mosque in Karbala wrote that, "the floors were as yet streaked with blood...Hangman nooses hung from the ceiling of an inner chamber in one mosque."<sup>187</sup>

Refugees interviewed in southern Iraq said that more than 5,000 bodies were strewn around the streets of Basra and that starvation was rampant in the south after the civil war.<sup>188</sup> In early April, the US Defense Department reported that "a systematic destruction of dwellings has taken place in population centers where insurgent activity was high." Spokesman Pete Williams stated that "we're unable to estimate the number of casualties, but there is no question that government retribution against insurgents has been violent and is causing widespread displacement of people."<sup>189</sup>

Stories of missing people, jailings and torture amongst Kurds abound, and these stories are substantiated by Amnesty International reports and other eyewitness accounts. "The latest reports coming out of Iraq speak of hundreds of people who have already been summarily killed in rebel areas," a 4 April 1991 Amnesty report said.<sup>190</sup> The restoration of control over some two dozen towns and cities was particularly brutal and bloody. "In the five weeks since the liberation of Kuwait, Baghdad has retaken every major rebel-held city and town, sometimes with terrifying vindictiveness," Time magazine reported on 15 April.<sup>191</sup>

Human rights abuses continue, even in Kuwait. Estimates are that 170,000 Palestinians who fled Kuwait - over half the pre-war Palestinian population of the country -- are barred from returning. Reports of mock trials, arbitrary arrests and disappearances continue through the beginning of May.<sup>192</sup>



## **Kurdish and Shiite Refugees on the Move**

The full extent of the human dislocation precipitated by the civil and the violent clashes with Saddam Hussein's army is still not completely understood. While Americans celebrated the return of the first troops, Saddam Hussein's elite Republican Guard was smashing two rebellions -- one of the Shiites in the south and the other of the Kurds in the north. This drove hundreds of thousands of civilians from their homes and communities, and eventually resulted in a two to three million strong human exodus.

US and other allied militaries soon joined the refugee relief process in southern Turkey and northern Iraq, but the number of Kurdish refugees overwhelmed relief efforts, with more than 800,000 Kurds in the north near Turkey, and another 1.2 million in and around the Iranian border.

At the beginning of May, the situation for the Kurdish people continues to be one of severe crisis. Many of the refugees are showing up to the camps wounded from the civil war.<sup>193</sup> "We estimate that somewhere between 25 to 50 percent are suffering from malnutrition," a refugee worker said on NBC's "Face the Nation" on 21 April. Estimates are that there is one doctor per 100,000 refugees,<sup>194</sup> and with continuing poor sanitation and limited food supplies, the incidences of sickness increased even as international relief increased.

UN refugee relief plans at the beginning of May call for the creation of refugee campsites in Jordan, Iran, Syria, and Turkey (some of which will be transit centers). This will provide space for approximately 300,000 refugees. The UN High Commissioner for Refugees is trying to provide assistance to an estimated 400,000 persons, 100,000 each in Iran, Jordan, Syria and Turkey, although there is a lack of money available to provide the needed care. Even as the refugee and transit camps expand, they can only hold a fraction of the refugees. Currently, Zahko, a city with a pre-war population of 52,000, is overflowing with refugees. If the security zone is not expanded to include the provincial capital of Dohuk, "we could wind up with a quarter-million people here, which would be crazy," US Maj. Gen. Jay Garner, commander of the coalition forces in northern Iraq said recently.<sup>195</sup>



## Destruction in Kuwait and Iraq

A UN field mission went to Iraq from 10-17 March and reported on the conditions of the country:

Nothing that we had seen or read had quite prepared us for the particular form of devastation which has now befallen the country. The recent conflict has wrought near-apocalyptic results upon the economic infrastructure of what had been, until January 1991, a rather highly urbanized and mechanized society. Now, most means of modern life support have been destroyed or rendered tenuous. Iraq has, for some time to come, been relegated to a pre-industrial age, but with all the disabilities of post-industrial dependency on an intensive use of energy and technology....It is unmistakable that the Iraqi people may soon face a further imminent catastrophe, which could include epidemic and famine, if massive life-supporting needs are not rapidly met.<sup>196</sup>

This report is now somewhat controversial, as it gives an extremely pessimistic view of Iraq's condition after the war, an apocalyptic picture of destruction that does not seem to be supported in other assessments. While the human tragedy in Iraq is easily pictured and quantified, the effects of the war on the man-made environment is more difficult to assess.

Almost three months after the ceasefire, some reports coming out of Baghdad tell a story of a city not particularly damaged, with basic civilian support services already being restored. An eyewitness account in The Nation reported that, in contrast to what a peace group expected to see, after the UN mission report,

...we found a city whose homes and offices were almost entirely intact, where the electricity was coming back on and the water was running. Not a normal place -- scarcity, grief, hardship and apprehension marked it -- but post-industrial enough for us to be caught in a lot of traffic jams.<sup>197</sup>

A New York Times reporter, after a three week trip to Iraq, reported on 12 May that

...the area around Baghdad...has quickly re-emerged into the 20th century.

Gasoline rationing was abolished on April 27, and by then electricity had been



restored, at least partly, to all main towns while water quality was improving steadily.<sup>198</sup>

It is possible that both the UN report and these later reports are equally correct, but this requires that the assessment of damage be adjusted to new standards suitable for this war. The Nation article, for instance, estimates that, based on observations of collateral damage in the city, probably no more than 3,000 civilian deaths occurred in Baghdad. While saying that 'surgical strikes' are dirty, it concludes that:

this would be the lowest number of civilian deaths from the bombing of a major city in the history of modern war: Consider the London Blitz, Dresden, Tokyo, Hiroshima, Nagasaki.<sup>199</sup>

But attacks on Baghdad can hardly be compared to any of these examples. Over the entire 43-day war, fewer than 3,000 individual weapons, comprising some 2,800 tons of ordnance, are estimated to have been dropped on targets in this huge city. This is a minuscule amount when compared to any of the mass city busting raids of the past, or even to more modern examples. In the 11-day "Linebacker II" operation in the Vietnam war, US aircraft dropped 15,000 tons of ordnance on Hanoi, 20 times the daily rate dropped on Baghdad during the Gulf War.

But more importantly, the damage caused in the air war cannot be described in yesterday's conventional terms. Numerous eyewitnesses have remarked about the strikes of precision guided munitions on individual buildings and structures in the city. In the words of the New York Times report

In the capital, the post office tower on Rashid Street, the Saddam Hussein conference center, the tall ministry of military industries building, the ministries of justice and local government and many telephone exchanges are all still standing with life going on busily around them. Only from close up is it apparent that they are gutted shells, their innards either collapsed or trying to burst through the windows.<sup>200</sup>

This was surgical destruction.

Thus it is possible that both types of reports about destruction in Iraq are true. Mass destruction was not the intent, and an observer assuming to find it would walk

away perplexed. Equally perplexing though, is the impact of the destruction of electricity production in a modern society, and its cascading effects on water supply, refrigeration, sanitation, etc. Similarly, paralyzing transportation or fuel distribution brings industrial society to a standstill. In this war, less rubble fell on people, and civilians were unusually spared the direct effects of bombs and death. But all around them, life support systems were severed, and the integrity of two complex societies was ruined.

### **Kuwait after the War**

Gen. Schwarzkopf recounted his feelings to Life Magazine when he first flew over Kuwait and southern Iraq on his way to meet Saddam's generals to discuss the terms of the ceasefire: "I was totally unprepared for what we saw. It was getting darker and darker and darker, then all of a sudden, it was black outside. Then I saw the fireballs all over the place, all this senseless destruction. I was angry and disgusted all at once. It was almost terrifying. All I could think was, 'I'm flying into hell.'"<sup>201</sup>

The first eyewitnesses in Kuwait told similar grim stories of the state of the country, particularly of Kuwait City. According to an eyewitness account of 27 February, "the shop windows lining the main thoroughfare, Al Jahra Street, have been smashed, and the glass litters the sidewalk. The Kuwaiti Airlines building has been torched, the fish market has been wrecked, the Mercedes-Benz dealership denuded of cars and then set ablaze."<sup>202</sup> "Shops, businesses and houses for 30 miles leading into Kuwait had been looted and burned," the Washington Post reported.<sup>203</sup> "There is hardly a block in Kuwait City...without a ransacked home" the Post said a week after liberation.<sup>204</sup> Garbage was overflowing in the streets; Iraqi military quarters were buried in garbage.<sup>205</sup> Reportedly, Kuwait's dairy cows had been killed and eaten by the Iraqis.<sup>206</sup>

The Boston Globe reported on 28 February, that "Kuwaitis yesterday described the seven-month Iraqi occupation of this city as one long brutality. They spoke of random, cruel killings by Iraqi security forces, of widespread torture and rape, of wholesale looting, of the wanton destruction of most of the city's important buildings."<sup>207</sup> The Washington Post observed that there was hardly "a family without someone killed, or imprisoned at one time." "Every government office and every symbol

of the Sabah family has been destroyed. Universities, schools, power plants, telephone exchanges, hotels and shopping malls are a shambles," the Post said.<sup>208</sup>

The torching and looting of Kuwaiti government, Sabah family, and luxury-related businesses was particularly evident. The Saif (Sief) and Dasman royal family palaces were bombed and stripped; the Foreign Ministry and Council of Ministers' chambers (National Assembly Building) were partially damaged and set ablaze. The National Museum was plundered of artifacts dating back to 3000 BC.<sup>209</sup> International hotels (the Marriott, Meridian, Plaza, and Sheraton) were largely destroyed. Galleries were reportedly ransacked within a few days of the Iraqi invasion. One eyewitness said that Iraqi "friends and family would come from Baghdad with trucks and take away everything they could lay their hands on."<sup>210</sup> An estimated 500,000 private and governmental vehicles -- cars and trucks, buses, ambulances and fire equipment -- were looted or stolen during the occupation and retreat.<sup>211</sup>

What wasn't destroyed was systematically stripped of its high tech equipment. The country's leading scientific and research institute was damaged and vandalized.<sup>212</sup> Kuwait's television and radio studios were stripped and hospitals were looted. The country's three oil refineries, all located close together on the coast south of Kuwait City, were reportedly severely damaged, and the al Ahmadi refinery was set ablaze.<sup>213</sup> Iraq stripped the assets of the Kuwait oil company, taking oil rigs, excavators, company records, pollution monitoring equipment, as well as more than 100 large specialized trucks, 30 bulldozers, and 40 to 50 front-end loaders.<sup>214</sup>

### **Assessing the Damage**

The reports of damage to Kuwait City during the occupation and the retreat are difficult to assess. Many interpretations of the level of damage are contradictory, and a great deal of damage can be attributed to the Kuwaiti resistance or allied bombardment. In addition, much of the damage observed by eyewitnesses when they reentered Kuwait City after the ceasefire, particularly that of the water and electrical supply systems, had been inflicted in the final week of the war, thus providing a distorted view of the deprivation during the occupation.

The various reports of massive destruction in Kuwait City have also been widely

contradicted. When the Marines arrived at Kuwaiti International Airport during their assault, one pool report said, "Many of the buildings at the airport were little more than rubble...[yet] despite the destruction, Marine engineers reported the runways were in good shape and needed only to be cleared of barricades and blown-up cars to allow aircraft to land."<sup>215</sup> Newsweek observed after the war that, "the airport was functional, backup electrical generators were available and roads and the water system were basically in good shape. "The bottom line is that damage is not as extensive as had been thought," one US military official told the magazine the week after the ceasefire.<sup>216</sup> An Associated Press pool reporter observed on 27 February that "Kuwait City looked a mess but not the war ravaged city some could have feared to see."<sup>217</sup> A Washington Post pool reporter wrote that "Throughout the city, destruction was spotty. Windows of some stores, such as jewelry and watch shops, were smashed and the contents looted. Many others were left untouched. Gaping holes yawned in the sides of several posh hotels....Overall, however, most buildings throughout the city, remained undisturbed."<sup>218</sup> The New York Times reported on 1 March that gas was available, albeit at only a few stations.<sup>219</sup> The Washington Post quoted an Army Corps of Engineers official as saying that "the water systems appear to be working...,"<sup>220</sup> and the Kuwaiti interior minister stated on 4 March that water and electricity could be restored to the capital within the week.<sup>221</sup>

Sorting out who was responsible for major damage to some facilities -- the Iraqi military, the Kuwaiti resistance, or allied attacks -- is proving to be difficult. There were reports, for instance, that the communications ministry, "had been heavily damaged by the Kuwaiti resistance in an effort to cut off the Iraqis' telephone-monitoring ability."<sup>222</sup> Other reports are circulating within the Defense Department of sabotage of communications facilities in Kuwait by the resistance (some of whom were assisted by US special operations forces).

Much of the destruction in Kuwait was also evidently caused by allied bombardment. From the first night of the air war, aircraft and cruise missile attacks were made on "strategic" targets in Kuwait, including communications and transportation related facilities.<sup>223</sup> A Newsweek pool reporter observed that "several industrial plants

on the outskirts of the city had been severely mauled by allied attacks including a Hyundai headquarters.<sup>224</sup> An "oil pumping station" that had been occupied by the Iraqis "had been leveled by allied attacks."<sup>225</sup> The Washington Times wrote on 4 March that "the city's AT&T phone system required only moderate repairs and adjustments after the air strikes of Operation Desert Storm."<sup>226</sup>

The firing of 16-inch artillery rounds also had significant impact on Kuwait's civil infrastructure. Gen. Walter Boomer, commander of Marine forces, said that fire from US Navy ships, not Iraqi bombs, had devastated the airport.<sup>227</sup> On 7 February, the battleship Wisconsin is also known to have fired 50 16-inch rounds against the Khawr al-Mufattah Marina, destroying or damaging 15 boats and naval sites.<sup>228</sup>

Finally, water and electricity systems had been out for about a week before the ceasefire.<sup>229</sup> Much of the damage was caused in the last week of the occupation, although the destruction, in the words of Kuwait's minister of electricity and water, had been done "in a very sophisticated way...They put bombs in the most crucial and most sensitive parts of our stations."<sup>230</sup> Kuwait's water supply was also sabotaged by retreating troops, "who blew up distillation and desalination plants as they fled the country."<sup>231</sup> According to press reports, the city's desalinization plant was "in ruins" at the end of the war,<sup>232</sup> and most of Kuwait's water desalinization capability "destroyed or disabled."<sup>233</sup>

### **The State of Iraq After the War**

The air war spared Iraq from indiscriminate destruction, yet efficiently disabled key aspects of the civilian society's support systems, with the attendant short- and long-term effects on the supply of basic services. Iraq's biggest problem in the post-war period is the destruction of its energy and power resources -- "an omnipresent obstacle to the success of even a short-term, massive effort to maintain life-sustaining conditions in each area of humanitarian need."<sup>234</sup> The lack of energy, together with the continuing effects of the embargo, led to a breakdown of public utilities and civil distribution systems in January, a state that Iraq was only recovering from in May.

The air war particularly affected the linked areas of transportation, sanitation, and

communications. Internal transportation was completely disrupted -- roads, bridges, and rail systems destroyed -- and the country left with a lack of fuel, spare parts, and tires.

In Baghdad and Basra, as in many other parts of Iraq at the end of the war, there was no central electricity, little water, no sewers, no telephones, nor any functioning civilian telecommunications systems.<sup>235</sup> Baghdad and Basra residents had been without regular running water or electricity supply since mid-January. Iraqi officials stated that allied bombing had knocked out 75 percent of the electrical generating plants in the country.<sup>236</sup> "Iraq in recent years had become a high tech society dependent on electric power generation for irrigation, medical services, communications and industry," a field report concluded.<sup>237</sup> A doctor in Iraq taking a humanitarian team through a hospital explained his problems: "To get water I need electricity. To get electricity I need a generator. To work the generator I need fuel. To get fuel I need a tanker. There are no tankers."<sup>238</sup>

Due to the overwhelming amount of sewage which has flowed into the streets and rivers, as well as the rising heat of summer, there is concern that diseases will spread without restraint as a result of the sanitation condition. A joint UN-WHO mission reported in early March that there were serious health problems already evident in Iraq. The shortage of clean drinking water, inoperative sewage treatment facilities, and a lack of electricity were the main contributors.<sup>239</sup> Doctors and staff, as well as patients, found it difficult to get to hospitals and health care facilities on a regular basis. In late March, one group reported: "vehicle rations were 20 liters per month, doctors not excepted."<sup>240</sup> Adding to the problem, the lack of a communications system leaves both the international and domestic rescue efforts without a way of tracking epidemics or other important health trends.

According to the UN, "The role of energy in Iraq is especially important because of the level of its urbanization (approximately 72 per cent of the population lives in towns and cities), its industrialization, and its prolonged, very hot summers." In addition, the UN field mission found in March that, "all previously viable sources of fuel and power (apart from a limited number of mobile generators)...are now, essentially, defunct...Additionally, there is much less than the minimum fuel required to provide the

energy needed for movement or transportation, irrigation, or power generators to pump water and sewage."<sup>241</sup> As of early March, practically all electrically operated installations had ceased to function, and diesel-operated generators were operating on a limited basis due to lack of fuel, maintenance problems, lack of spare parts, or worker absence. Numerous oil refineries in Iraq were damaged or destroyed, and hydro-power generators were inoperable at the end of April.<sup>242</sup>

The civil war in Iraq obviously complicates an accurate measurement of the state of the country, and obscures who is to blame for much of the damage to civilian facilities. Reports are, for instance, that 14 hospitals in Iraq were damaged in the war, but it unclear whether the damage was done by air bombardment, or during the civil strife.<sup>243</sup> According to the New York Times, "To see World War II-type urban devastation one must go to the southern towns of Karbala, Najaf and Basra, most of which have literally been flattened. But this mainly reflects the Iraqi army's savage postwar repression of the Shiite uprisings, not the allied air raids."<sup>244</sup> Nevertheless, the breakdown of communications, together with civil unrest, "mean that the authorities are as yet scarcely able even to measure the dimensions of the calamity, much less respond to its consequences..."<sup>245</sup>

#### **Water Supply and Public Sanitation**

The water treatment system in Baghdad ceased to function early on in the air war. Pumping stations and purification plants, which were operated on electrical power, were unable to function. The 75 percent that were provided with diesel generator back up power had to be operated sparingly because of the lack of fuel. In early March, the UN reported that the water supply was at 10 percent of its pre-war capacity.

According to the UN, "untreated sewage has now to be dumped directly into the [Tigris] river -- which is the source of the water supply -- and all drinking-water plants there and throughout the rest of the country are using river water with high sewage contamination....While the water authority has warned that water must be boiled, there is little fuel to do this, and what exists is diminishing."<sup>246</sup>

Reports in late March showed that families in Baghdad were receiving an estimated 50-75 liters of water per person per day for all personal and household uses.

The lack of electricity continues to prevent water treatment stations from operating. "Each of Baghdad's sewage treatment plants are not able to function at all because they require approximately three megawatts of electricity, far beyond the capacity of any available stand-by generator," one humanitarian team reported.<sup>247</sup>

As of late March, Baghdad's sewage treatment and pumping plants were at a virtual standstill, and the UN observed that "pools of sewage lie in the streets and villages."<sup>248</sup> A Washington Post eyewitness reported in early March that "gushing streams of raw sewage" were fouling the Tigris River. Officials stated that the river was "also receiving huge amounts of raw sewage north of the city."<sup>249</sup> Baghdad's sewers, like those in most of the other cities of the world, do not separate rainwater from sewage, further exacerbating the problems of a lack of available and clean drinking water.<sup>250</sup>

In addition, chemicals for water purification are largely unavailable. According to a report in the Washington Post, allied air raids had hit plants "that manufacture purification chemicals such as chlorine."<sup>251</sup> As of early March, Baghdad was also experiencing a complete lack of garbage disposal. According to the UN, "Heaps of garbage are spread in the urban areas and collection is poor to non-existent."<sup>252</sup>

### **Public Health**

According to Save the Children, "Prior to the war, Iraq's health system was well equipped to meet the needs of children and their families."<sup>253</sup> After the war, the health care system was in crisis, with complete disruption of basic services, from preventive health care to vaccinations, to care for war wounded. The country of 18.8 million people also has one of the highest percentages of children of any country in the world -- about 3.6 million people or 20 percent of the population is under the age of five. (At least 4.5 million of the population of Iraq is children of school age.) The young population is particularly vulnerable.<sup>254</sup>

UNICEF stated in March that the three million under-five children were "at risk" due to the health conditions of the country.<sup>255</sup> The flight of the Kurds has significantly exacerbated childhood health vulnerability -- some 25 percent of the two to three million refugees in northern Iraq, Turkey, and Iran, are estimated to be under the age of five.



As of late February, the supply of drugs and medical supplies were critically short, and deaths had already occurred due to lack of antibiotics.<sup>256</sup> As the embargo was lifted, relief workers continued to complain about the problems of distribution. Many hospitals continued to be without heat or refrigeration, most without electricity, and they were also critically understaffed.

Government food rations as of late February had been reduced to 1,000 calories per person a day.<sup>257</sup> Diarrheal diseases and intestinal infections, particularly among children under five years of age, were reported as four times greater than the previous year.<sup>258</sup> According to a WHO official, the country at the end of the war was facing the threat of typhoid and cholera outbreaks,<sup>259</sup> as well as of hepatitis and polio.<sup>260</sup> Typhoid and malaria were reported near Suq ash-Shyukh in the south;<sup>261</sup> but the WHO stated in mid-March that they saw no evidence of cholera or typhoid outbreaks among Iraqi refugees in Iran.<sup>262</sup>

### **Food Supply**

Prior to the civil war, the availability of food in most of Iraq was considered barely adequate, with stockpiles dwindling. Prices at Baghdad markets had risen to as much as five times the normal, and were beyond the reach of many people.<sup>263</sup> Food continued to be rationed through the beginning of May. Early on, the government allocation was set at 1,000 calories. "One thousand calories is approximately half the amount needed by the average sized adult engaged in very light activity," Save the Children stated.<sup>264</sup> According to the UN, in addition, "The quality of food distributed has itself deteriorated to the point of causing health problems."<sup>265</sup>

Prior to the war, Iraq imported about 70 percent of its food needs, including seeds and feed products for livestock. Agricultural production in the country is highly mechanized, and dependent on pumped-water irrigation. The lack of energy to drive machines and pump water will affect this June's harvest, making "an already grave situation...further aggravated."<sup>266</sup> Lack of spare parts also affects the operation of pumps and harvesting machines. In addition, the destruction of the single laboratory in the country producing veterinary vaccines prevents authorities from supporting livestock farmers in the combat of disease. Insecticides are "virtually out of stock" because of the

sanctions and the lack of chemical supplies.<sup>267</sup>

With one-fifth of the pre-war population of Iraq still displaced at the beginning of May, and the population of Baghdad significantly depleted, Iraq's major domestic problem remains "a dramatic rise in the price of everything, especially food, that began with the trade embargo."<sup>268</sup> Given the high percentage of children in the Iraqi population, the problems with food supply will have particularly long-term effects.

### **Looking To The Future**

Several months after the ceasefire, the impact of the war and the situation in Iraq is still difficult to assess. As much as one-fifth of the pre-war population is dislocated or on the move, as many as 10,000 homes were destroyed or damaged during the air war,<sup>269</sup> and countless others were destroyed in the civil war. Sporadic water and electrical supplies exist, particularly in the major cities, but food shortages persist, and civil communications and transportation disruptions continue to plague the country.

Iraq has been on a war footing almost continually since 1980, and has become increasingly isolated as a result. The sole available surface transport link with the outside world is via Amman to Aqaba. There is no cargo transportation link to Syria, nor to Iran. As a result of the war, the ports of Basra and Umm Qasr are largely out of use. The exodus of over one million migrant workers depleted as much as half of the country's work force. The remaining Iraqi workers are unable to come to work or have no work to do; the UN reported in March that approximately 90 percent of industrial production had "been reduced to inactivity..."<sup>270</sup>

While much has been said about the conditions in Baghdad, where more than one-quarter of the pre-war population resided, the southern city of Basra, Iraq's second largest, was particularly hard hit. Like in Baghdad, electricity had been off in Basra since the second day of the war, and according to US military analysts, had still not been restored at the end of April. Basra was also at the center of disorder during the Iraqi retreat from Kuwait, and was the scene of some of the most intense fighting between Saddam loyalists and Shiite rebels.

The air war was particularly intense in this city of 800,000 people. On 5 February, an eyewitness reported from Basra that the air war had brought "a hellish nightmare of

fires and smoke so dense that witnesses say the sun hasn't been clearly visible for several days at a time...[that the bombing is] leveling some entire city blocks... [and that there are] bomb craters the size of football fields and an untold number of casualties..."<sup>271</sup> "Basra is totally damaged," a Philadelphia Inquirer reporter wrote. "There is no petrol, no water. There are people dead in the roads, and nobody is moving them" a refugee said in Jordan the first week of February.<sup>272</sup>

On 14 March, the first mobile water purification units, supplied by the ICRC, began producing potable water in Baghdad. ICRC goals are to restore 25 percent of the usual water supply in the city.<sup>273</sup> On 22 March, the UN Security Council lifted its embargo in food supplies to Iraq and eased restrictions on shipments of certain critical humanitarian goods including fuel for trucks and electrical generators. Estimates appear to agree that it will take about one year to restore power generation and oil refining.<sup>274</sup>

In late March, contracts worth more than US \$550 million had been signed to restore water, food and medical supplies, sanitation, power, telecommunications, and transportation, as well as to conduct basic damage assessments.<sup>275</sup> None of the support for recovery of the internal Iraqi civil infrastructure, though, is coming from the US. President Bush told a press conference on 1 March that "I don't want to see one single dime of the United States taxpayers' money go into the reconstruction of Iraq," even if Saddam Hussein is ousted.

A United Nations Development Program Task Force is looking at several options for economic reconstruction, as well as for a way to facilitate the reintegration of returnees in the region. Special programs are particularly being prepared to assist women and children as a result of the unique effects on their population. There has been a significant increase in the number of female-headed households in the Iran-Iraq war and this war,<sup>276</sup> and the school system is completely disrupted, with the drop-out rate predicted to at least quadruple as a result of the war.<sup>277</sup> UNICEF and WHO are working toward establishing a disease surveillance system, essential to controlling epidemics.<sup>278</sup>

## The Effect of the War on the Natural Environment

On 22 January, the environmental effects of the Gulf War gained attention with reports of intentional fires being set by Iraq at three Kuwaiti facilities. The al Khafji oil storage facility and refinery in Saudi Arabia also began to leak oil around 22-23 January as a result of artillery fire from Iraqi forces. (This was the source of the oil on the beaches in Saudi Arabia observed on television on 25 January.)

On 25 January, the US announced a much larger spill at the Sea Island Terminal, a pumping station for the Mina al Ahmadi crude oil tank farm, located some eight miles off the coast. The Sea Island Terminal reportedly began spilling oil on 19 January, after Iraq opened the valves. The US says it first detected the oil spillage on 24 January, and on 25 January, US Navy ships and aircraft engaged an Iraqi vessel laying mines near the Sea Island Terminal, setting a part of the terminal and surrounding water afire. Gen. Schwarzkopf said that on examination of US operations, "I can tell you that we see absolutely no indication at all -- no indication at all that any US military action caused this to happen."<sup>279</sup>

The US military, after discussions with Saudi officials, decided to mount a military operation to stem the flow of oil into the Gulf from Sea Island. The decision was taken to bomb two land-based oil storage facilities at al Ahmadi, and on 26 January, Air Force F-111 aircraft fired GBU-15 electro-optical glide bombs at the system of pipes that control the flow of oil to the terminal. By 28 January, the Pentagon stated that the oil flow had been stopped.

Five Iraqi tankers moored at Mina al Ahmadi on the Kuwaiti coast were also the source of a significant amount of oil spilled in the water. On 25 January, the Pentagon reported that "at least half" of the oil in the Gulf "comes from oil tankers loaded up with crude oil from Mina al Bakr....Long before Operation Desert Storm began, five tankers took their oil down to the occupied Kuwaiti port of Mina al Ahmadi. They've been there, holding their oil, since last October. The oil the Iraqis are now dumping into the Gulf is coming off those tankers..."

Gen. Schwarzkopf stated on 27 January that the tankers had been emptied of

their oil. "These ships on the 16th of January were low in the water," he said, "they were completely full of oil. As of this time, on the 24th of January [when air reconnaissance was conducted], these five ships right here were apparently emptied of oil, or almost empty, because they are riding very, very high in the water."<sup>280</sup>

### **Assessing the Size of the Spill**

After initial estimates on an 11 million barrel (462 million gallon) oil spill in the Gulf, it now appears that the amount is perhaps one-half to one-fifth of the original estimates. The UNEP reported on 22 February, that based on visual sightings, it estimated the spill to contain about one million barrels of oil.<sup>281</sup> Saudi authorities at that same time estimated the spill to contain 1.5-2 million barrels.<sup>282</sup>

But there is still not an authoritative estimate of the oil spill size.<sup>283</sup> The New York Times reported on 7 April that "no one is sure how large" the spill is.<sup>284</sup> The 1-2 million barrel estimates from late February, according to US Coast Guard and Defense Department sources, include only the oil off and around the Saudi shoreline, but does not include oil in the center of the Gulf, along the Kuwaiti coastline, nor the oil in Iraqi waters or that on the north (Iranian) coast.<sup>285</sup> It is estimated that the total spill volume is closer to 2.5-3 million barrels, and possibly as large as 4 million, the first or second worst spill in history. In addition, the Times also reported that "oil terminals and tankers are still drooling into the Persian Gulf at a rate of 1,500 barrels, or about 63,000 gallons a day."<sup>286</sup>

The largest source of oil in the Gulf is believed to be from the Sea Island Terminal, which the Defense Department estimated to be flowing at the rate of about 100,000 barrels per day. Initial reports were that some six million barrels (250 million gallons) had been dumped into the Gulf from the Sea Island Terminal.<sup>287</sup> If the 100,000 barrels a day average is correct, then ten days of flow (19-28 January) would have spilled about one million barrels. On 27 January, Gen. Schwarzkopf said the spill was about 35 miles long and 10 miles wide.

On 26 January, Pete Williams stated that the five tankers at al Ahmadi had a capacity to hold three million barrels, "that's just part of what has been dumped into the

waters of the Persian Gulf." It is not known what the actual fill of the tankers was, but Defense Department analysts believe it was no more than one million barrels. The al Khafji spill is considered to be a relatively small spill, and the oil leaking from the Iraqi loading terminal at Mina al Bakr in the northern Gulf is thought to be tens of thousands of barrels.<sup>288</sup>

The oil covers from 240-400 square miles of water, from near Bubiyan Island off the Iraqi-Kuwaiti coast, to Bahrain in the south. Calm winds in the end of January reportedly slowed the spread of the slick. The oil moved primarily with shoreline currents rather than with the winds, contrary to many trajectory prediction models of oil movement, but following the overall "anti-clockwise gyre" in the Gulf.<sup>289</sup> On 6 February, oil reached Safaniya, Saudi Arabia, where it fouled offshore oil operations, and threatened a desalination plant. It continued to move down the Saudi coast, much slower than expected, and reached the island of Abu Ali by the end of March.<sup>290</sup> By May, favorable winds as well as the island itself, were reportedly keeping the oil away from al Jubayl, where the world's largest desalination plant is located, although the spread and break out of the slick was continuing.<sup>291</sup>

Over 400 kilometers of Saudi coast, as well as the southern Kuwaiti coast, had been damaged by May. Many different slicks were reported, most broken off from the main body of oil. Much of the oil had sunk, was lying in shallow water, or had washed ashore and collected in coastal mud flats and marshes. A light sheen was reported as far south as Bahrain, where tar balls had washed up on the beaches.

### **Effects of Oil on the Gulf**

As the oil has spread down the Kuwaiti and Saudi coastlines towards the smaller Gulf states, the coastal areas, mud flats, seagrasses, and algae have been threatened. The 88,800 sq. mile Persian Gulf is a particularly shallow (average depth of 35 meters, or about 100 feet), warm, and highly salty body of water, with rich fauna and flora on the sea beds, as well as coastal mud flats and seagrass beds. Mud flats are extensive along the Saudi coast, and are some of the most productive habitats. Because the Gulf is almost completely enclosed, being connected to the Indian Ocean through the narrow

passage at the Strait of Hormuz, there is a very slow current exchange with the ocean, with consequently less water action and dissipation.<sup>292</sup>

Many of the Gulf's renewable resources lie in the shallow waters (between less than five and 10 meters depth), and are particularly susceptible to oil pollution. Intertidal areas are also highly vulnerable to oil -- both because of poor drainage and because the oil becomes incorporated into sediments.<sup>293</sup> Equally vulnerable are the extensive beds of seagrass, which are the most productive of the subtidal habitats. According to one analysis, "the biggest long-term threat to the ecosystem would come from any damage to the oxygen-producing plants and algae that live on the Gulf's sea bed."<sup>294</sup>

Dr. Andrew Price, advisor to the International Union for Conservation of Nature and Natural Resources (IUCN), points out that "the Gulf's natural resources are fundamental to regional prosperity and development...Of prime importance is freshwater, much of which is now produced from coastal desalination plants."<sup>295</sup> In Saudi Arabia, 70-80 percent of the population receives their drinking water from desalination plants.

Fish, sea turtles, marine mammals (dugongs and dolphins), birds, and invertebrates may all become contaminated through ingestion of oiled food, or, for birds through preening of oiled plumage. Many of these species are threatened, including green and hawksbill turtles, and the dugong.

There is also much concern that the oil spill will have adverse effects on the migration of European species of birds to the marshes and intertidal flats of the Gulf. The total number of migrating and wintering birds is estimated to be over two million, and a number of these species are also in threatened or vulnerable categories. The ingestion of very small quantities of oil is known to be fatal to birds. The slick reportedly killed an estimated 20,000 birds by the end of February, including cormorants, grebes, flamingoes, and herons.<sup>296</sup>

The oil has also likely caused long-term damage to both commercial and subsistence fisheries in the Gulf. Some 1,000 fishing boats exist in the Gulf -- a multi-million dollar industry<sup>297</sup> -- and much of the fishing is done off of the Saudi coast. About 10,000 Bahrainis make their living from commercial fishing.<sup>298</sup> Oil has already

reportedly "wiped out" Saudi Arabian shrimp beds in shallow coastal waters.<sup>299</sup>

### **Destruction of the Oil Wells and the Oil Fires**

Within days of the August invasion, Iraq was preparing to destroy the oil infrastructure of the country, an effort which ultimately proved to be the most competent act carried out by Saddam Hussein's forces. According to American oil experts, who spoke to the Washington Post, "it took 1,000 troops and 30 to 40 engineers to plan and execute the destruction. Nothing was left to chance. And the results bore out the Iraqis' planning."

Iraq actually did experiments to see how to best blow up a wellhead, and started wiring the wells soon after the invasion. In December, Iraqi experts "blew up six wells...in the Ahmadi area as experiments to see how best you could do it."<sup>300</sup> Engineering and explosives work was then painstakingly carried out, with the wellheads being wired together, and thousands of trenches dug to protect wiring from armored vehicle movement through the oil fields.

When the air war began on 16 January, the first fires occurred when Iraqi artillery set an oil storage tank aflame at al-Khafji in Saudi Arabia.<sup>301</sup> Soon enough, destruction of the Kuwait oil fields started. The al Wafrah oil fields and storage facilities in Kuwait were reported on fire on 21 January, producing large amounts of smoke. On 22 January, Iraq set fire to facilities at two Kuwaiti oil refineries or storage tanks (al Shuaiba and Mina Abdullah).<sup>302</sup> One report says that some 60 wells were blown up by the end of the month.<sup>303</sup>

The destruction of the oil fields began in earnest at the end of February. On 22 February, the US military announced that over 149 wells had been set on fire, 100 in the last 24 hours. Over 190 oil fires were reported burning the next day. On 25 February, 517 wellheads and other facilities were reported burning or destroyed in Kuwait; a number that was estimated to reach 580.<sup>304</sup>

The wells were effectively destroyed. "In about two-thirds of the explosions," one fire-fighting expert told the Washington Post,  
the wellheads were blown completely off, sparking roiling orange infernos...In



other instances, the well heads were badly damaged and the structures of above-ground valves and pipes were destroyed. In still others, the explosions ruined the wellheads but failed to ignite the oil, leaving black geysers shooting into the air at a rate of 40,000 barrels a day and pooling into petroleum lakes up to four feet deep, and spreading daily.<sup>305</sup>

On the night of 27 February, one pool reporter wrote that "The wells in the vast al-Wafra field are mostly oozing black crude onto the sands. There's so much of it flowing out that the oil is collecting in giant black lakes of thick crude."<sup>306</sup>

Before Iraqi forces fled from Kuwait, they blew up as many as 800 oil wells, storage tanks, refineries, and oil-related facilities, including 580 wells set on fire, and another 200 damaged.<sup>307</sup> Conflicting estimates have mainly been due to the thick smoke shrouding the oil fields, as well as the addition of the 200 wells in the "neutral zone" on the Kuwaiti border (which Iraq also occupied).<sup>308</sup>

In addition to some 580 wells on fire, at the end of April, another 80 to 100 wells were flowing uncontrollably but were not on fire.<sup>309</sup> Large amounts of oil were collecting on the ground around destroyed wells. One report described "Volcanic like lakes of shiny oil" lining the sides of the road.<sup>310</sup> Some of the leaking oil has been ignited, and is forming "fiery lakes of thick sludge" around well heads.<sup>311</sup> There is fear that the "oozing giant oil puddles...could threaten nearby towns and their groundwater supplies, or even creep into the Persian Gulf's waters."<sup>312</sup>

The most serious fires are concentrated in the greater Burgan fields, located south of Kuwait City (these include fires in the Burgan, Magwa, and Um Gudair fields). Other fires are burning in the al Wafrah, Minagish, Raudhatain, and Sabriyah fields. Burgan is the second largest in the world, and accounted for about 60 percent of Kuwaiti oil output before the war, with a reserve of about 55 billion barrels.<sup>313</sup>

Estimates range from 2.5-3 million<sup>314</sup> to 6 million barrels of oil burning each day.<sup>315</sup> The fires have created a 15,000 square kilometer cloud of smoke and soot, and weather conditions have generally carried the plume towards the south and southeast.<sup>316</sup>

### **Black Rain and Smoke Effects**

With millions of barrels of oil a day continuing to burn out of control, greasy acid rain, the so-called "black rain," together with smoke and soot, is blackening the sky, fouling the surrounding land and water, and causing adverse health effects. "Barely 10 miles south of Kuwait City," the New York Times reported in early March, "the sun disappears and black oily soot settles on passing cars and coats the flat desert scrub."<sup>317</sup>

There have been reports that oil fires are releasing large amounts of toxic chemicals into the air, including sulphur dioxide, carbon monoxide, and carcinogenic combustion products like benzopyrene. But hardly any scientific data has been publicly released. The US government interagency assessment team reported in April that they "did not detect such chemicals in any significant quantity...,"<sup>318</sup> but the New York Times reported that

scientists briefly detected concentrations of particulates at levels as high as 10 times the amount deemed permissible under Federal regulations in the United States. The total amount of oil-related pollutants generated by the fire -- an estimated 500,000 tons daily -- is believed to be 10 times that emitted by all United States industries and power plants combined.<sup>319</sup>

A half dozen wells at the Minagish field in western Kuwait are also believed to be capable of spewing highly toxic hydrogen sulfide gas.<sup>320</sup>

The human health effects are clearly apparent. According to the Washington Post, "The atmosphere around some high-pressure wells is 'extremely flammable as well as dangerously poisonous,' according to a Defense Department analysis...." "After you breath it," a Post reporter said, "you start coughing and gagging."<sup>321</sup> These human effects from the fires are being felt as far as 20 miles away.

At the end of March, the World Health Organization warned people with heart or respiratory problems to remain indoors when the smoke plume is overhead. Kuwaiti clinics have seen a sharp rise in patients suffering chronic respiratory problems such as asthma and bronchitis, and the elderly and very young have experienced an increase in routine respiratory diseases.

The oil fires are also having effects further afield. Starting on 22 January, repeated "black rain" events started in Iran, and were extending from Dezful in the north

to Shiraz in the south. By mid-March, black rain and smoke were reported in Turkey and throughout Iran,<sup>322</sup> as well as in Bulgaria, the southern Soviet Union, Afghanistan, and Pakistan.<sup>323</sup> The governor of the Adana state in Turkey ordered residents in early March not to use rainwater or let their animals drink it.<sup>324</sup> On 1 April, the German Press Agency (DPA) reported that black rain had been detected in the Himalayan region of the Indian Kashmir.<sup>325</sup> Traces of soot are being detected in the northern hemisphere.<sup>326</sup> US government scientists also detected unusually high levels of soot in Hawaii in early February.

Because sunlight is not reaching the desert floor, the temperature in the oil fields is 20-25 degrees fahrenheit cooler than in nearby Kuwait City. Lower regional temperatures could have the effect of shortening growing seasons, endangering Iraq's own agricultural economy. In addition, according to experts, "If millions of tons of oil and gas burn for one to two years in Kuwait, as feared...the fallout and the rise in acidity can affect forests and food crops."<sup>327</sup> Animals and birds are also threatened by the oil fires, as they either graze on plants covered with an oily film or ingest oil while preening.<sup>328</sup>

Smoke containing high amounts of sulphur is also being washed to the ground, damaging drinking water sources. The smoke dumps soot which pollutes the snow in Iranian and Turkish mountain ranges that later melts into lakes and streams, feeding into the drinking water supplies.<sup>329</sup> Prolonged soot fallout will also have significant effects on desert ecosystems.

While there have been a number of theories put forth about long-term disruptions in weather patterns resulting from smoke injection into the stratosphere, up through May little had been published to determine to what extent this had occurred. The plume has generally stayed below 12,000 ft, but March through July are windier months than January and February. According to the US interagency assessment team, "there are normally 30 days of very strong winds from the northwest in this period, which produce sandstorms and rapidly ventilate the smoke. As the summer progresses, it is possible that the height of the plume will increase and that it will then be evident to greater distances."<sup>330</sup> From August through October, strong winds should drop sharply, and

"atmospheric inversions" could trap pollutants over Kuwait.<sup>331</sup>

### **The Environmental Recovery and Clean-up Effort**

The worst oil spill in history occurred in a war zone, where secrecy and bureaucratic infighting significantly impeded any response. Weeks went by before any major effort was expended to contain the spill's effects.<sup>332</sup> "After weeks of delay and confusion among rival Saudi agencies," the New York Times reported on 3 March, "the cleanup received a boost recently when the state-owned oil conglomerate, Saudi Aramco, assumed control of coordinating the response from another agency, the Meteorology and Environmental Protection Administration (MEPA)."<sup>333</sup>

Through May, the spill effort was concentrated on the protection of sea-water intake systems at desalination and industrial plants, and the oil slicks continued to move south in the Gulf, as coastal habitats were covered with oil.

While many comparisons have been made between cleaning up after the Exxon Valdez accident and the Gulf spill, an important difference is that Exxon hired over 11,000 workers to "clean up" the Alaska shoreline, and even then the damage was extensive and persistent. There have also been contradictory statements as to the ease with which oil will be removed from the shoreline of the Gulf. One company involved in the Exxon Valdez cleanup asserts that removing oil from the Gulf will be easier than from the rocky Alaska coast.<sup>334</sup> Another concludes that "It will simply not be possible to clean up many of the Gulf's habitats once they have become contaminated by oil. Access is limited, and physical removal so difficult that greater damage may be done by trying."<sup>335</sup> Cost of the coastal cleanup and recovery effort are estimated to be as high as \$5 billion.

To combat the Gulf oil spills, state-of-the-art cleanup technology -- booms, skimmers, chemical dispersants, and bioremediation<sup>336</sup> -- are being employed or contemplated. Most of the traditional cleanup methods have some effect against limited spills, and in accessible locations. But in the Persian Gulf, given the amount of time which went by before a major effort was underway, it is expected that most of this effort will yield only limited results.

In addition to the laying of booms around important industrial plants, Saudi Arabia and Bahrain are also attempting to recover oil in the water. Huge ponds have been constructed in the desert to hold oil pumped from the water. On 10 March, AFP quoted teams working in Bahrain as having pumped more than 160,000 barrels of crude from the water.<sup>337</sup> On 7 April, the New York Times reported that more than one-half million barrels had been recovered.<sup>338</sup>

At the end of April, most of the oil around Saudi Arabia had ended up in shallow waters, where recovery operations are generally hampered. Sand blowing from the desert onto the water has also made the oil on the surface heavier, contributing to much of the slick sinking. Some of the oil has also emulsified, turning into a "mousse" that is 70 percent water. According to the US Coast Guard, some of the slick has formed an "asphaltine" shell that resists mechanical dispersal.<sup>339</sup> A report of the Congressional Research Service on 22 March concluded that, given the amount of time that had transpired, "a mechanical cleanup does not appear feasible."<sup>340</sup>

### **Putting Out the Oil Fires**

By the end of March, fire fighting crews had managed to shut down eleven gushing wells that had been sabotaged but not set afire, but no fires were extinguished until 7 April.<sup>341</sup> Even then, the first fire put out was a relatively small one, and Kuwaiti oil officials stated that the experimental technique of pumping liquid nitrogen into the fire to cut off the supply of oxygen would only be effective with some 200 of the 580 burning wells.<sup>342</sup>

The bigger fires will still require large amounts of water to extinguish them, and this method necessitates a pipeline being laid from the Gulf to inland locations near the wells. Large, ten foot deep, man-made lagoons are being built in the desert to store the water.<sup>343</sup>

By early May, fire fighting teams had capped some 80 gushing wells, and extinguished 70 fires. A lack of equipment, bureaucratic hold-ups, and a limit in the number of trained fire fighting teams, continued to hamper more intense fire fighting efforts. "The magnitude of the problem is beyond the capacity of Kuwait,

administratively, technically and financially," a Kuwaiti oil official had stated in March.<sup>344</sup> With only a handful of companies specializing in oil-field fire fighting, the disaster also exceeded the capacity of the international community to solve.<sup>345</sup>

Estimates vary as to how long it will take to completely extinguish all of the fires. Kuwaiti government spokesmen say two years, but others say as much as a decade. One authoritative estimate of the cost to rebuild the oil fields is \$25 billion.<sup>346</sup>



## Understanding Modern War

Throughout the war, a number of issues were raised in the news media, as well as by numerous governments, regarding the effects of the intense allied bombardment and ground assault. Were the allies bombing civilians? Were the targets being struck directly contributing to the military victory? Were the military operations being carried out in accordance with the stated objectives, UN mandates, and requirements for the proper conduct of war?

Here, perhaps the ultimate irony of an intense and modern war is revealed, where individual missions and weapons are employed in accordance with reasonable interpretations of the "laws" of war can have minimal impact on the successful attainment of modern war objectives, while having far greater effects on the lives of the civilian population. Of course, the objective of any war is to achieve victory as quickly as possible, within certain constraints. But the rapidity of the Gulf War, and the precision with which the country was disabled, raises questions as to whether the standard and traditional targets of attack remain legitimate and necessary.

US military leaders assert that "all efforts" were made during the war to minimize effects on the civilian population. And there appear to be only a few exceptions to these assurances. Area bombing (indiscriminate attacks) of cities or highly populated areas was restricted. The availability of "smart weapons" technology bolstered the restriction, as major military objectives could be achieved without resorting to indiscriminate attacks. "The overwhelming part of it is the fact that we have the capability," to avoid collateral damage, Gen. Schwarzkopf said. "Therefore, if we have the capability, this coalition...[has] deliberately determined to use that capability to limit the damage against innocent people..."<sup>347</sup>

Because cities were not targeted, however, does not mean that targets in cities were avoided. The selection of a target near a populated area, or other restricted site (schools, hospitals, religious shrines), generally meant that guided weapons were employed in an attempt to avoid effects outside the area of the target. This was not always successfully achieved, either because of pilot error, weapons failure, or poor



information and instructions (the so-called unintentional "collateral damage"). In addition, as a result of the expense of smart weapons and their limited stockpile, the capability of aircraft, and the targeters' determination of the necessity for limitation of collateral damage at specific targets, the preponderance of weapons chosen were not guided bombs and missiles, but less accurate "dumb" bombs.

In all cases, allied planners assert that the principle of "military necessity" guided the selection of targets. Throughout the war, the Bush Administration, and allied military spokesmen, stated that only "military" targets were being hit. On 7 February, in response to a press question, Brig. Gen. Richard Neal said that "it's a target rich environment, and there's plenty of other targets we can attack," other than residential areas. Neal further said on 11 February that if Iraq moved military personnel into civilian facilities, "they assume by international law the responsibility for the protection of any civilians that are in those type structures. That's an important point to keep in mind. But our policy remains staying away from civilian structures at this time."<sup>348</sup>

Brig. Gen. Neal was in essence saying that the successful conduct of the war allowed the allies to continue to avoid "civilian targets." There were, nonetheless, widespread attacks on the civilian infrastructure. Electrical supply; civil communications; oil supply, storage and refining; transportation means; and general governmental activity throughout the country were bombed. In the tradition of strategic bombing, the Air Force described these facilities as generically "vital to any nation's ability to use military power."<sup>349</sup> But while the choice of the classes of these targets may not be in dispute, the necessity for attacking them, in terms of achieving the specific objectives of this war, and given its postulated duration, remains unclear.

In addition, there were reports of attacks on targets of no importance vis a vis the war effort, such as water treatment stations and water-related chemical production plants.<sup>350</sup> Special operations forces also reportedly disabled water wells.<sup>351</sup> On 27 January, Gen. Schwarzkopf stated, "I will tell you quite candidly, that there are several almost predominantly civilian facilities right now that I would like very much to attack because I know for a fact they're being used by the Iraqis, and we're not doing it for that reason."<sup>352</sup> It is unclear just what classes of targets Gen. Schwarzkopf was referring to,

but is difficult to imagine why destruction of civilian electrical production, water supply, or oil refining doesn't fit the "predominantly civilian" category as well, particularly in light of the assumption of the allies that the war would only last about one month.

Up until the end of the war, civilian targets were still being hit in Baghdad, including the downtown ministries of Industry and Military Industrialization, Municipal Affairs, and Justice, targets which, at that point, had little bearing on the outcome of the war.<sup>353</sup> Despite numerous statements of US military leaders that the Iraqi army had been defeated, as well as some confidence that contact between Baghdad and the front in the south had been severed, communications targets, mostly serving civilian functions, continued to be struck and re-struck to the end. In fact, according to Air Force Times, during the final ground phase, "Baghdad was targeted for some of the heaviest bombardments since Jan. 17."<sup>354</sup>

Even though the selection of targets may be a matter of dispute, there is no doubt that the military recognizes that attacks on the civilian infrastructure affects non-combatants. On 30 January, Gen. Schwarzkopf stated that "I think I should point out right here that we never had any intention of destroying 100 percent of all the Iraqi electrical power. 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."<sup>355</sup> Responding to reports that 50 to 90 percent of Iraq's oil industry had been destroyed, Gen. Schwarzkopf said that "we went after militarily significant targets. We didn't want to destroy their oil industry, but we certainly wanted to make sure they didn't have a lot of gasoline for their military vehicles."<sup>356</sup>

Where is the dividing line between what is "legitimate" in term of these attacks and what is not? Is it acceptable to destroy a modern society's way of life through the destruction of electricity production, water purification, and fuel distribution, yet unacceptable to destroy oil wells? Is it acceptable to kill more than 100,000 troops in conventional bombardment, and yet not kill them with chemical or nuclear weapons?

On 11 February, Lt. Gen. Kelly justified attacks on Iraq's electrical grid and the water system as intending to damage the military capacity of Iraq. "If there is an additional effect on the civilian population," Kelly stated, "it's one that Saddam Hussein

has chosen, not one that we did."<sup>357</sup> Similarly, on 11 February, Brig. Gen. Neal described the reason for damage in Basra:

It's important to understand that Basra is a military town in the true sense. It is described as a major naval base and port facility. The military infrastructure is closely interwoven within the city of Basra itself....Such things as chemical storage, POL storage, military warehouses, and a large military infrastructure does exist in and around the Basra port area....

I think our targeteers and the guys that deliver the ordnance, have taken extraordinary steps to try and limit collateral damage. But I will be quite frank and honest with you, that there is going to be collateral damage because of the proximity of these targets close to, abutting civilian sites.<sup>358</sup>

In an urban and industrial society such as Iraq, the intermingling of civilian and military assets is a fact of life. What a military planner may see in terms of a "target rich environment" does not eliminate the reality of communications and energy sectors that are highly complex and centralized, serving military and non-military needs. Saddam Hussein no more "chose" to put government ministries and military facilities in Baghdad or Basra than the US chose to put them in Norfolk or San Diego.

With the reach of modern weapons, there are few sanctuaries against attack. The notion of "surgical" strikes has been met with great derision, if only because the theory and weapons emerged at the time when massive area bombardment and environmental devastation was also being practiced in Vietnam. Even though less than ten percent of the total number of weapons shot in the war were smart weapons, the effect of the bombing campaign on the civil infrastructure proved widespread and devastating. Given the duration of the war, in addition, the number of deaths caused was extraordinary. This just goes to show that surgery can kill as well. It may just do so with greater skill, and with fewer external wounds.

### **Smart Weapons and Dumb Bombs**

In all, some 2,800 fixed wing aircraft flew more than 110,000 sorties from 16 January to the ceasefire on 28 February. More than 50 percent are estimated to have

been actual bombing or attack missions; the remainder were combat missions involving aerial refueling, fighter escort, electronic warfare, or reconnaissance. US Air Force planes flew 50 percent of the total number of fixed wing missions. US Navy aircraft contributed 16 percent, 36 percent of those sorties attack missions;<sup>359</sup> and US Marine Corps aviation flew seven percent. Allied aircraft flew 27 percent of the total sorties (some 30,000). Royal Saudi Air Force planes flew more than 10,000 sorties. British aircraft flew 6,500, 4,000 of which were combat sorties. French aircraft flew about 2,000 sorties, 1,387 of which were combat sorties,<sup>360</sup> and Italian, Canadian, Kuwaiti, Bahrainian, and Qatari aircraft flew the remainder of the missions.

The attack sorties can be generally split between three classes of targets:

- approximately 20,000 sorties flown against over 300 "strategic" targets throughout Iraq and Kuwait -- governmental, communications and transportation targets, factories, military bases, and airfields (excluding SCUD missile related targets),
- approximately 5,000 sorties flown against SCUD missile launchers and support bases, and
- approximately 30,000-50,000 sorties flown against Iraqi military forces in southern Iraq and Kuwait.

It is estimated that fewer than 1,500 attack sorties were flown against targets in the Baghdad metropolitan area and that 3,000 weapons (all laser-guided bombs or sea-launched cruise missiles) were delivered.<sup>361</sup> Something on the order of 10,000 vehicles were attacked from the air during the war.<sup>362</sup>

Overall, the US military estimated that it destroyed or captured 3,700 out of the 4,030 tanks deployed in the Kuwaiti theater, 2,400 armored vehicles of 2,870, and 2,600 artillery guns out of 3,110. Some 300 aircraft (of 809 combat aircraft, 411 air interceptors and 398 fighters) were eliminated, including some 150 that escaped to sanctuary in Iran.<sup>363</sup> Allied aircraft damaged or destroyed 375 of Iraq's 594 aircraft shelters, demolishing an estimated 141 aircraft inside.<sup>364</sup> More than 100 Iraqi naval vessels were destroyed.<sup>365</sup>

A full and accurate account of the devastation and defeat of Iraqi forces in Kuwait and southern Iraq during the ground war is still not available. But the anecdotal

evidence indicates an unprecedented impact for air and ground attacks. US Marines captured, destroyed or damaged 1,060 tanks, 608 armored personnel carriers, 432 artillery pieces, and five FROG and two SCUD missile launchers.<sup>366</sup> The 1st Marine Division destroyed an estimated 310 Iraqi tanks in combat.<sup>367</sup> The 2nd Marine Division destroyed at least 250 tanks and other fighting vehicles.<sup>368</sup>

The US 1st Armored Division reported 309 tanks, 318 armored personnel carriers, dozens of artillery guns, and hundreds of trucks destroyed.<sup>369</sup> The 24th Infantry Division estimated that it destroyed more than 300 armored and wheeled vehicles and more than 100 artillery guns, as well as more than 25 helicopters and jets up to the ceasefire.<sup>370</sup> The 1st (British) Armoured Division destroyed 200 tanks, 100 armored personnel carriers, and 100 artillery guns.<sup>371</sup>

It is not precisely known the quantity of weapons expended by the allies in the war. About 50 B-52 bombers delivered 72,000 individual weapons (mostly bombs, and possibly a few missiles) totaling 25,700 tons in 1,624 missions. This constituted 29 percent of the total tonnage dropped by the allies.<sup>372</sup> Some 42 F-117 stealth fighters flew 1,271 missions<sup>373</sup> and dropped over 2,000 tons of laser-guided bombs, an average of about two weapons per mission.<sup>374</sup> The Navy and Marine Corps dropped some 21,000 individual weapons, and fired some 1,000 missiles.<sup>375</sup> British forces dropped some 6,000 individual weapons from the air, including 100 missiles.<sup>376</sup> Based upon these numbers, and other information, it is estimated that 250,000 individual bombs and missiles were delivered from the air.<sup>377</sup>

Of the 250,000 individual weapons delivered, about 22,000 were guided, or "smart" weapons. It is estimated that some 9,000-10,000 of these were laser-guided bombs; some 2,000 were anti-radiation missiles (fired at radar installations), and another 10,000 were guided anti-tank weapons. (A significant number of the laser-guided bombs were also fired at armored vehicles and bunkers on the battlefield).

Approximately 90 percent of the smart weapons delivered in the war were delivered by Air Force aircraft, and some ten percent of all smart weapons were delivered by F-117 stealth fighters (that constituted one percent of the fixed wing aircraft force). Stealth fighters delivered about 2,500 laser-guided bombs, and were said to have

destroyed more than 40 percent of the "strategic" targets.<sup>378</sup> Of the 88,500 tons of ordnance dropped by the air forces, 7,400 tons were smart weapons.<sup>379</sup>

Thus 92 percent of the weapons delivered in the war by tonnage, and 90 percent of the individual weapons, were unguided, or "dumb" bombs. The number of smart weapons dropped was still approximately 50 percent more than the number dropped during the entire Vietnam War, but the reality is that the number is far less than was, or is, commonly understood by the public.

The weapons delivered by air are not the complete inventory of the tonnage dropped on Kuwait and Iraq. Artillery and multiple rocket launcher fire is thought to constitute another 20,000-30,000 tons of ordnance.<sup>380</sup> The two Navy battleships -- Missouri and Wisconsin -- fired about 2.5 million pounds of shells (1,250 tons), roughly the equivalent of 540 A-6 missions, according to the Navy.<sup>381</sup> It is estimated that at least 5,000<sup>382</sup> Multiple Launch Rocket System (MLRS) ground-launched rockets were fired by US and British forces in the war, each rocket containing 644 "improved conventional submunitions."<sup>383</sup> A single British division fired more than 2,500 rounds of 8-inch, and 10,000 rounds of 155mm ammunition.<sup>384</sup> US ground forces are believed to have fired five to ten times this amount.

### **Assessing the Air Strikes**

In 43 days of war, US and allied air forces delivered a daily average of 2,100 tons of explosives, and almost 6,000 individual weapons. From the opening moments of the war, the use of precision guided munitions, or "smart" bombs, set the tone for the way the war would be understood and evaluated. "Technology that guides cruise missiles so precisely that one fired from a battleship in the Red Sea clipped a communications tower in Baghdad neatly in two, according to witnesses in the Iraqi capital," the New York Times wrote on 23 January.<sup>385</sup> Air strikes that have "been fantastically accurate," President Bush said on 6 February.

Gen. Powell's statement the first morning of the war that "we are rating 80 percent of...[air sorties] as having been effective, meaning the aircraft got to its target, delivered its ordnance and returned," set off a debate that was never quite resolved over

weapons accuracy and effects on the Iraqi civilian population. Gen. Powell meant that 20 percent of the air missions were aborted for mechanical, weather-related, or other reasons (such as the inability of the pilot to identify the target), and not that 80 percent of the ordnance dropped hit their targets. As the Washington Post pointed out on 22 January, the 80 percent success rate "does not reflect the US military's assessment of how many targets were successfully destroyed..."<sup>386</sup>

Throughout the war, military spokesmen left the impression that a huge number of smart weapons were being fired, and that a huge percentage were hitting their targets. (It is important to keep in mind that it wasn't until 15 March that the percentage of smart weapons used in the war -- less than 10 percent -- was even made public by the Air Force). The New York Times reported at the end of the war that "An allied military spokesman reported last week that of the many thousands of precision-guided bombs and missiles launched at Iraqi military targets, fewer than one-tenth of 1 percent had gone astray and fallen in civilian areas."<sup>387</sup> Lt. Gen. Horner told Air Force Times just following the ceasefire that precision guided munitions hit their targets 97-98 percent of the time that they were dropped. Horner said misses occurred because sudden clouds obliterated the target or because of malfunctions.<sup>388</sup> Gen. McPeak said on 15 March that "on the order of 90 percent" of the laser-guided bombs hit their targets during the war.<sup>389</sup>

This hyperbole about smart weapons, nevertheless, appears to be more or less true. The accuracy of weapons varied by the delivering aircraft, by mission, and by the phase of the war. It may not be the 95 or 99 percent described by the military during the war, but it is believed to average about 80 percent for all precision-guided weapons. After preliminary analysis, the F-117 stealth fighter, believed to be the most accurate laser-guided delivery plane, is believed to have had an 80-85 "bomb hit rate,"<sup>390</sup> while about 80 percent of the laser-guided bombs and precision munitions dropped by the F-15E and F-111 fighter-bombers hit their targets.<sup>391</sup> There have been other reports that as few as 60 percent of laser-guided bombs "hit their targets, and the other 40 percent have missed sometimes by thousands of feet,"<sup>392</sup> but these could not be confirmed in discussions with Air Force analysts.

While the Air Force continues to proclaim that precision guided munitions "did the most important work" during the air war,<sup>393</sup> the vast majority of weapons delivered were not guided. The accuracy of these weapons, many of which were directed against strategic targets throughout Iraq and Kuwait, was far less than for guided weapons. On 22 February, the Washington Post reported that bombing accuracy had been "lower than 50 percent for many unguided munitions..." "[T]housands of 'dumb' bombs, have missed their targets and in some cases struck unintended sites." the Post said.<sup>394</sup> According to Aviation Week & Space Technology, "Early analysis indicates dumb bombs dropped by attack aircraft were not all that effective..."<sup>395</sup> More than one-half of the unguided bombs fell outside of the designated target circles, Aviation Week concluded. "Dumb bombs were not all that effective," Frank Kendall, Defense Department tactical warfare programs director told the magazine. "One of the lessons that came out of this, and I'll quote the science adviser to the commander-in-chief, is that dumb bombs are just that."<sup>396</sup>

The inaccuracy of aerial attacks can partly be attributed to the absolute US priority of sustaining low allied casualties. After the Iraqi centralized air defense system of surface-to-air missiles was destroyed in the early days of the war, allied aircraft were directed to bomb Iraqi targets from medium to high altitudes, within the area of previously lethal surface-to-air missile range, but above the effective range of anti-aircraft artillery guns.<sup>397</sup> Most of the subsequent bombing thus took place from altitudes of 15,000-20,000 ft.<sup>398</sup> B-52 bombers dropped their bombs from even higher, 35,000-40,000 feet.<sup>399</sup> As Aviation Week points out, "The problem with bombing from higher altitudes is the loss of accuracy when using unguided weapons."<sup>400</sup>

The information available so far on the accuracy of smart weapons allows only preliminary conclusions. But, as a result of a number of interviews with reliable military sources, it appears that there are no technical reasons to change the prevailing picture of smart weapons. More important to understand weapons accuracy is that the performance of virtually all types of weapons -- anti-radiation weapons, anti-tank missiles, laser-guided bombs -- exceeded most of the military's expectations. Large numbers of individual tanks and armored vehicles were able to be hit by bombs and



missiles from the air for the first time in combat. Bridges and bunkers, even factories, fell more easily when smart weapons were employed.

During the war, a number of individual weapons ran into problems because of weather interference, because of the high altitude of delivery, and sometimes because of the characteristics of the delivery aircraft. But the variety of different weapons available to the allies, and some expedient modifications to weapons or tactics during the war, generally allowed allies forces to recoup their absolute advantage.

With some 20 percent of smart weapons, and more than 50 percent of dumb bombs missing their targets, the lingering questions remains the impact of the air war on the civilian population. Accuracy levels alone do not necessarily mean that collateral damage or civilian deaths were caused by a "miss." Gen. McPeak said on 20 March that, "There's a certain amount of mythology about missing the target. We're much better now at hitting aim points than in World War II or Vietnam. We expect miss distances in the 10- to 20-meter category rather than 100 to 200 meters. If you miss a tank by 10 meters, you're likely to do a lot of damage to the crew."<sup>401</sup>

In addition, many of the strategic targets being hit in the war were not particularly near populated areas, or even particularly heavily populated themselves -- air defense radars and surface-to-air missiles sites, SCUD missile sites, airbases, military bases outside of the Kuwaiti theater, many rural bridges had low levels of even military manpower associated with them. Some cases of collateral damage have been admitted where aircraft attacking bridges in towns and cities missed their targets, and some civilian deaths occurred during "road interdiction" in search of supply transports and SCUD missiles, but the majority of strategic attacks seemed to be confined to targets large enough to contain the effects even of misses.

When a weapon "misses" a target, of course, a distinction has to be made as to whether the miss is a colloquial miss or a military miss. A miss by military definition often means the failure to destroy a specific objective, such as a building or installation within a larger complex. This varies from the colloquial understanding of a miss, which means a stray weapon landing outside of a military complex altogether.

There is also a lack of understanding in the press, and amongst the public, as to

the level of effort that is anticipated to destroy given targets. Repeated attacks don't necessarily mean that the attacks are unsuccessful. There were many instances during the war where commentators stated that attacks on targets were not being met with success, such as attacks on bridges,<sup>402</sup> but there were other cases where such observations did not particularly relate to weapons inaccuracy.

Assessing the accuracy and success of an attack, and its impact on surrounding civilian populations, demands taking into consideration the size or complexity of a target, many of which demanded numerous attacks. Airfields in Iraq, for instance, were particularly large, and attacks were directed against runways, underground command and control installations, hardened fuel facilities, hardened ammunition storage igloos, as well as individual hangarages. Perhaps 10 percent of the entire strategic bombing effort was directed against these particularly tough targets.

Undoubtedly many complete misses occurred in the attack on strategic targets, large and small, and many can be documented based upon the reporting from the war. But even here, Iraq doesn't claim more than a thousand or so civilian deaths as a result of collateral damage (although this number is still colored by the government's desire to assure the population that the war was not that destructive).<sup>403</sup> The ultimate effect of the air campaign on the civil population has to be assessed with other criteria in mind in order to learn the lessons from this modern war.

### **The Issue of Collateral Damage**

"With the combination of stealth and precision attack capability," Gen. McPeak stated in his briefing on 15 March, "we were able to attack targets very discretely."<sup>404</sup> The process of targeting and attacking the civil and military-related infrastructure in Iraq and Kuwait included a number of measures to avoid "collateral damage," as well as to minimize the effects of bombardment on non-combatants. Selection of targets and weapons, attack headings, and strict rules of engagement, governed the general conduct of military operations. Nonetheless, numerous instances of collateral damage occurred, even if they were unintentional.

On 23 January, Gen. Powell said that he thought the air war had been "awfully

good in avoiding collateral damage....I can't say that there was no collateral damage, but some of the claims that have been out there that we have struck religious and cultural sites, I have seen no hard evidence to suggest we did that."<sup>405</sup> Lt. Gen. Horner told Air Force Magazine that his mandate was to "avoid any damage to civilian targets and to the holy shrines that happen to be located in Iraq..."<sup>406</sup> "We tried to make sure that attack headings were not aligned with Moslem holy sites, libraries, hospitals and so forth," Gen. McPeak stated, "so that in case we had a short round or a long round -- it might fall in a residential -- so be it, such things happen. We tried as much as we could to protect cultural attractions."<sup>407</sup>

Throughout the air war, pilots were also given instructions ("rules of engagement") specifically to avoid attacks on civilian targets and vehicles. According to Sec. Cheney, pilots had "clear instructions to launch weapons only when they are certain they've selected the right targets under correct conditions."<sup>408</sup> Rear Adm. Ronald Zlatoper, commander of the USS Ranger aircraft carrier battlegroup told a pool reporter on 27 February that he had reminded his aviators not to hit non-military targets. "Our job is to take out Iraqi armor and armored personnel carriers and not buses."<sup>409</sup> Gen. Schwarzkopf described B-52 bomber attacks against Iraqi military forces:

I don't think that what we're doing would be described as carpet bombing. Carpet bombing tends to portray something totally indiscriminate, en masse without regard to the target. I think we've stated all along that we're absolutely as careful as we can -- not only in the way we are going about executing our air campaign, but in the type of armament we're using. We're using the appropriate weapon against the appropriate targets. We're being very, very careful in our direction of attacks to avoid damage of any kind to civilian installations. It is going to happen, it's absolutely going to happen, there's no question about it, but we're doing everything we can to prevent it, and that's not carpet bombing by any definition.<sup>410</sup>

A number of others methods were also reportedly used to avoid collateral damage, particularly in Baghdad. The only vehicles used to strike targets in the heavily populated city were the F-117 stealth fighter, the F-111F fighter, and the Tomahawk sea-

launched cruise missile. The aircraft exclusively carried laser-guided bombs, and the newer stealth fighter was reportedly used to attack 95 percent of every "primary" target in Baghdad.<sup>411</sup> Gen. McPeak told Defense Week that allied bombing was carried out at night to minimize damage to civilian locations.<sup>412</sup> Gen. McPeak summarized the US effort:

We did not carpet bomb downtown Baghdad. As a matter of fact, it's obvious to anyone who has been watching on television, the pictures of Baghdad neighborhoods untouched, people driving around, walking around on the sidewalks and so forth. We took special care to make sure that we attacked only military targets, and we attacked them quite precisely. Air crews were informed to bring home the ordnance if they weren't sure they were locked to the right targets. We made very few mistakes. I'm quite proud of the fact that we achieved high levels of destruction against military targets with minimum collateral damage.<sup>413</sup>

In downtown Baghdad, where the "leadership" and command and control facilities were concentrated, special forces personnel ("commandos") were also reportedly infiltrated into the city to serve as laser spotters, thereby increasing the accuracy of the precision guided weapons.<sup>414</sup> Another report said that a "gossamer-like" material was dropped on electrical plants to possibly guide or aid bombing.<sup>415</sup>

### **Instances of Collateral Damage**

For all the efforts taken, and there were many, collateral damage still resulted. Speaking to Sam Donaldson on the ABC News "Primetime Live" show on 24 January, Lt. Gen. Horner said, "I don't know how you conduct any kind of military operation and not have innocents injured...If Iraq says I've injured a civilian, I'll have to accept, yes, that's probably true, because that's part of war. Have I tried my utmost to keep from injuring civilians? Absolutely."<sup>416</sup> Given the admission from the military that some 30-50 percent of dumb bombs, and 80 percent of smart weapons hit their targets in the war, it is not surprising that there are numerous accounts of collateral damage caused from bombing.

Lt. Gen. Horner told the New York Times that "To do the things that we did in Baghdad in the old days would have taken large number (sic) of bombs with a lot of damage to surrounding areas. These guys went out there night after night and took out individual buildings."<sup>417</sup> Air Force Sec. Donald Rice stated on 16 March that the precision of the stealth fighters "guaranteed that military efforts were focused on military targets."<sup>418</sup> The Air Force "White Paper" on the war states that "When it was important to avoid collateral damage, civilian casualties, or to directly hit a target, PGMs [Precision Guided Munitions] were the right choice. F-117 attacks over Baghdad demonstrated the ability to precisely kill military targets while minimizing civilian casualties."<sup>419</sup>

Numerous civilians were reported wounded in residential neighborhoods in Baghdad as a result of allied bombing.<sup>420</sup> Refugees entering Jordan reported that the residential neighborhoods of Jadriyyah, Qadissiyya, and Havy Al Mansour in Baghdad, as well as the Doura central bus station, were hit.<sup>421</sup> A shopping center adjacent to a Baghdad telecommunications building was wrecked, as were other buildings near telecommunications centers.<sup>422</sup> An attack on a communications facilities in Najaf, south of Baghdad, reportedly killed some 20 civilians in a residential area.<sup>423</sup> There were reports of a civilian building across from the Interior Ministry in Baghdad being hit.<sup>424</sup>

Attacks against Basra reportedly included destruction of civilian warehouses.<sup>425</sup> A miss on a military command center in Basra narrowly missed a Mosque.<sup>426</sup> The most detailed claims of collateral damage in Basra come from former US Attorney General Ramsey Clark, who recounted some dozen instances of collateral damage, including damage to schools, the Al Makal mosque, and a teaching hospital.

In the second week of the air war, Jordanian television reportedly showed pictures of a church hit near the northern city of Mosul.<sup>427</sup> Attacks on industrial facilities in the town of Hasawa, south of Baghdad, reportedly killed numerous civilians in residential neighborhoods; and attacks in the industrial town of Ramadi reportedly hit a school and a hospital.<sup>428</sup> Ramsey Clark reported extensive damage in Diwaniya.

There were reportedly numerous cases of civilian deaths caused when Kuwaiti or

foreign worker's vehicles were hit on roads while they were fleeing Kuwait City and other major cities, including Baghdad, mostly headed for Jordan.<sup>429</sup> A humanitarian team traveling in Iraq 24-28 March reported on some of the road damage: "The six-lane highway between the Jordan border and Baghdad was badly damaged...we stopped twice to examine bombed and strafed vehicles including what appeared to have been a Red Crescent ambulance/bus."<sup>430</sup>

A US military spokesman stated on 5 February that road attacks were taking place, "arguing that it was impossible to tell which trucks were carrying civilian cargo and which were carrying military materiel."<sup>431</sup> Many of the people fleeing Baghdad left in trucks and buses, and they were the targets of allied air attack, attacks that otherwise had to intent of interdicting the movement of military supplies or reducing the maneuver room of SCUD missiles.<sup>432</sup>

The specific cases of collateral damage include:

- Two civilians were reportedly killed and nine injured in 17 January attacks on the electrical power plant in Taji, north of Baghdad.<sup>433</sup>

- On 23 January, Iraqi radio reported that 38 civilians were killed and 10 were wounded during air attacks at al-Waziriyah and Tikrit.<sup>434</sup>

- On 25 January, Peter Arnett reported on CNN that he had been taken to Dour, 160 km north of Baghdad and 20 km southeast of Tikrit, where he observed 23 brick homes "flattened as though shaken by an earthquake." Iraqi officials said 24 civilians were killed.<sup>435</sup>

- On 31 January, the Jordanian Foreign Minister stated that allied planes had bombed oil trucks and civilians moving along the highway from Iraq to Jordan.<sup>436</sup>

- On 6 February, the AP reported that Baghdad radio claimed hundreds of civilian dead, including children, as a result of bombing in the southern Iraqi town of Nasiriya, southeast of Baghdad on the Tigris River.<sup>437</sup> The next day, western journalists were taken to Nasiriya, where they were told that 47 civilians had been killed when a bridge across the Euphrates river was bombed the previous afternoon.<sup>438</sup>

- Eleven civilians were killed and 49 were wounded when allied planes struck the al-Yarmuk Hotel in Diwaninieh, 110 miles south of Baghdad.<sup>439</sup>

- On 9 February, the 566-bed Adan hospital, 20 miles south of Kuwait City, was hit in a bombing attack. The attack left four craters about 15 feet wide and five feet deep, and hit a dormitory, killing four and wounding 15 civilians.<sup>440</sup>

- On 13 February, Jordanian refugees from Kuwait said that 30 civilians were killed and 24 were wounded when allied planes attacked their bus near the Iraqi-Jordanian border.<sup>441</sup> Another thirty civilians were reportedly killed when a bus was hit in Kuwait.<sup>442</sup>

- On 16 February, a laser-guided bomb dropped by the Royal Air Force in the town of Fallujah hit a residential area and killed 130 civilians.<sup>443</sup>

- On 3 March, reporters were taken by Iraqi authorities to the Rustumiya sewage treatment plant on the southern outskirts of Baghdad, "which apparently came under allied missile attack."<sup>444</sup>

- On 3 March, the Sarafiya water pumping station in Baghdad was visited by reporters, and "had apparently been bombed."<sup>445</sup>

- According to the UN, "The sole laboratory producing veterinary vaccines was destroyed during the conflict...[and] all stocks of vaccine were stated to have been destroyed in the same sequence of bombardments..."<sup>446</sup>

- According to the UN, vegetable seed warehouses in Iraq were destroyed, presumably unintentionally.<sup>447</sup>

### **The Amiriya Shelter Bombing**

In the early morning of 13 February, a pair of F-117 stealth fighters dropped two GBU-27 2,000 lb laser-guided bombs on a reinforced concrete building in the Amiriya section of suburban Baghdad. US targeters had identified the air raid shelter in western Baghdad -- Public Shelter No. 25 -- as a military command center, and the case hardened bombs were directed to penetrate the steel reinforced roof and detonate inside.<sup>448</sup>

Immediately western journalists were brought to the shelter by Iraqi officials, and there were scenes of hundreds of civilian casualties being brought from the smoldering facility.<sup>449</sup> The bombing appeared to be the worst single incident of civilian casualties as a result of bombing in the war, with more than 400 of 1,000 people in the shelter --

more than half of them children -- being killed.<sup>450</sup>

News of the bombing immediately intensified international statements about the destructiveness of the air war, particularly as pictures of burned and dying Iraqi civilians were shown extensively on television.<sup>451</sup> According to the New York Times, Gen. Schwarzkopf

angrily denied once again that his forces were purposely striking civilian targets, as charged by Iraq, and one of his aides said there was 'no way, no way at all' the United States would refrain from hitting all urban military targets, even for a brief time...<sup>452</sup>

US spokesmen attempted to prove that the facility was a military command bunker, releasing drawings derived from satellite imagery, and referring to signals intelligence "intercepts" of military communications going through the facility.<sup>453</sup> The structure, adjacent to a school and a Mosque, was surrounded by a barbed wire fence, and the roof, according to US military targeters, was painted "with camouflage patterns."<sup>454</sup>

The shelter was on the targeting list, reportedly together with some 20 other command and control facilities around the capital, and US intelligence believed that it was a "leadership" bunker designed for senior Iraqi officials.<sup>455</sup> The New York Times reported that the "building was one of 25 structures that were initially built as bomb shelters during the Iran-Iraq war. In 1985, at least 10 of them were converted into hardened military command posts..."<sup>456</sup>

US intelligence officials claimed that the shelter became an important target due to the success in destroying military headquarters and communications facilities, which had forced the Iraqis to disperse to secondary sites.<sup>457</sup> The immediate press controversy centered over whether the shelter was actually being used as a command center at the time of the attack. According to the Washington Post, "A senior Pentagon official last night said that earlier in the war the bunker had been used as a communications 'node' to transmit orders originating elsewhere in Baghdad."<sup>458</sup>

Although US officials initially stated that they did not know if the shelter had ceased to be operated as a civilian bomb shelter,<sup>459</sup> Brig. Gen. Neal stated that, over the last two or three weeks, the bunker had become "an active command-and-control structure...that



was communicating with the leadership within the KTO [Kuwaiti Theater of Operations]." Officials told the New York Times that "American intelligence showed Iraqi military trucks going to and from the building in early February. In addition, limousines that carry Iraq's senior leaders were also observed going to and from the building."<sup>460</sup>

As proof couldn't be found, or wasn't released of specific uses of the shelter on the night of the attacks, US spokesmen shifted the blame to Saddam Hussein for placing civilians in danger in an otherwise military facility. "From a personal point of view," Brig. Gen. Richard Neal said in Riyadh, "I'm outraged that civilians might have been placed in harm's way, and I blame the Iraqi government and the Iraqi leadership for that."<sup>461</sup> "Saddam might now be resorting to a practice of deliberately placing civilians in harm's way," Sec. Cheney stated. The White House was adamant, nonetheless, in stating that no mistake was made in the attack. "There's no review, no change of procedures, no change in policy, no change in targeting development at all," Marlin Fitzwater said on 14 February.<sup>462</sup>

Nonetheless, US military officers, particularly Lt. Gen. Thomas Kelly of the Joint Chiefs of Staff, pledged to reconsider targeting judgements given the death of so many civilians. "It looks like civilians were hurt here," Lt. Gen. Kelly stated at the Pentagon on 13 February. "We are going to examine our consciences very closely to determine if we can't do something in the future to preclude that....Obviously we didn't know that the civilians were in there or we wouldn't have bombed the thing." "If we wanted to hurt civilians, that's the easiest thing in the world to do," Kelly said the next day,

We could have tens of thousands of them hurt. We could have run this operation the way the Iraqis ran their operation against the Iranians. We could have fired missiles up there that are terribly inaccurate right into the middle of their cities. We've done none of that.<sup>463</sup>

After having been given unrestricted access to the facility, most members of the news media reported that they could see no sign of military function. A number of sources later agreed the facility was not being used as a command and control bunker at the time of the attack, and retired Gen. Michael Dugan, former Air Force Chief of Staff,

stated that the intelligence information "was not the most current information."<sup>464</sup>

As the Amiriya bombing controversy continued, stories began to circulate about another supposed command and control center, located in the basement of the Al-Rashid Hotel in Baghdad.<sup>465</sup> Reporters were taken to the hotel by Iraqi officials on 14 February, and were allowed to inspect the basement, finding no evidence of a specific military command center or communications lines. Pentagon sources still insisted, nonetheless, that the hotel operated as a military fiber optic network control station.

The military explanation of the bombing of the Amiriya shelter is that it was necessitated by an actual shift in the Iraqi military command network, and that the facility was a legitimate military objective, because of its transmission of communications to military forces. Three other complementary explanations are also possible. First is that the mission of attacking command and control was a self-driven allied priority and that new targets were constantly identified based upon signals intelligence (the listening in on communications, and the monitoring of electronic emissions). Signals monitoring, according to military analysts, was a source of intelligence that proved more plentiful and useful during the war than battlefield photographic reconnaissance.

Thus, the US military culture, which places great emphasis on electronic command and control, and the US military, which spends so much money to build, protect, and destroy communications and command devices, was naturally driven to shut down any "live" networks in Iraq, even if those networks were playing only a minor role in the controlling the military in the south.

The second possible explanation is that bad weather pushed the date to strike Amiriya to late in the war. In the early going of the air war, according to Gen. McPeak, "we lost a lot of targets, especially to the 117 [F-117 stealth fighter], where low cloud cover prevented them from acquiring the target, and they simply brought the munitions home."<sup>466</sup> Since F-117s were being used almost exclusively to strike targets in downtown Baghdad, perhaps the bunkers just fell down lower in the target list. They were thus struck when the weather cleared, and Amiriya appeared on the target roster. This would explain the reasons why some spokesmen have explained the "old" information that indicated that the shelter was carrying out a military function.

The third explanation is that Amiriya was specifically targeted to kill Saddam Hussein or other high ranking military or civilian leaders in the government. There were rumors that other command centers were also being hit; in any case, it is doubtful that Amiriya was the only one. Aviation Week & Space Technology reported after the war that a specially designed penetrating weapon was used in the last week of February against another military bunker north of Baghdad. "Some defense officials said the mission was targeted against the Iraqi military high command and Hussein himself."<sup>467</sup> After the war, Deputy Prime Minister Tariq Aziz told the Washington Post that the Amiriya shelter was not a civilian "leadership" bunker: "Aziz disputed reports that the raid killed some relatives and officials close to Saddam who may have taken refuge there. 'Nobody in my family was injured, nor were any of those from other members of the leadership,' he said."<sup>468</sup>

### **Destroying Bridges**

Destruction of Iraqi bridges provides another insight into the justification for attacks on Iraq's civil infrastructure. Bombing efforts were directed against 54 "major" railroad and highway bridges.<sup>469</sup> The majority of bridges struck were on the two main highways running south from Baghdad to Basra, as well as a number of bridges to the west of Baghdad. According to Gen. McPeak, "Some were important to use because they were on the road system out through the launch boxes for SCUDs and we wanted to prevent movement of mobile SCUDs. But most were important to prevent the reinforcement of the deployed field army."<sup>470</sup>

On 30 January, the Defense Department announced that 33 of 36 targeted railroad and highway bridges had been bombed in over 790 sorties. Gen. Powell stated that the Kuwaiti theater had been isolated by the strikes, and that the resupply effort had been degraded from 20,000 to 2,000 tons of materiel flowing into the Kuwaiti theater daily. At the end of the war, 40 of the 54 bridges were reported inoperable; 10 were damaged; and four were undamaged.<sup>471</sup> There were reports of dozens of bombed bridges slumped into the Euphrates and Tigris rivers, and a handful of bridges destroyed in Baghdad. One eyewitness, for instance, reported that at the end of the war, three of

the six bridges over the Tigris River in central Baghdad had been destroyed by allied bombs.<sup>472</sup>

On 12 February, Lt. Gen. Kelly gave the clearest explanation of why bridges were attacked:

We said in the past that linear things are difficult to interdict, so if you cut a road or a railroad or a pipeline or things of that nature, they can be repaired relatively easily. You can get a bulldozer and repair a road. It might not be a smooth ride, but it's workable. Whereas, if you can take out a bridge, you have created a much more serious interdiction problem. The theater of operations are dominated by the Tigris and Euphrates Rivers. Therefore, the Iraqis have to cross those rivers in order to provide war materiel to their forces at the front. What we would like to do is see those forces at the front atrophy....

If you take out the highway bridges out over the river, it...has the bonus effect of causing traffic backups at the bridges. When those traffic backups are military in nature, they make lucrative targets for our aircraft to attack...<sup>473</sup>

There were also rumors that the bridges were the conduits for Iraqi fiber optic and other communications networks, and therefore were a convenient target for disrupting command and control of the Iraqi government and military.<sup>474</sup>

A large number of sorties were eventually expended on the bridge busting mission, but there were reports that beyond a small number of key bridges funneling supplies to the Kuwait theater, bridges were more targets of opportunity than key to stemming reinforcements and supplies.<sup>475</sup> The destruction of roads and bridges in Iraq can only be justified if in fact those bridges are providing "direct support" of military forces, in particular serving the integrity of Iraqi forces in Kuwait. The US conducted road interdiction of southern supply lines; convoys were a fruitful target, as they could be destroyed with less expensive weapons.

Asked on 15 March why some bridges were destroyed and some were left standing, Gen McPeak stated, "we had about 40 out of the 50-odd that we were tracking that were in the water at the end of the time. They didn't get them all. It only lasted 33 days, and we really didn't start on bridges until about day seven to ten."<sup>476</sup> McPeak's

admission that the number of bridges destroyed was set by the duration of the war seems to support the conclusion that many bridge attacks were of minor importance. In fact, as Aviation Week reported, bridges became a convenient secondary target to direct pilots to if their primary targets were aborted. "Commanders feared collateral damage could increase if pilots roamed the countryside looking for alternates, so specific bridges were a common F-117A secondary target."<sup>477</sup>

### **Destruction of Nuclear Facilities**

The destruction of Iraq's nuclear infrastructure crept into the Bush Administration's war objectives in late 1990, bolstered by November public opinion polls that showed Americans were particularly fearful of Saddam's nuclear weapons. During his Thanksgiving visit to troops in Saudi Arabia, President Bush declared that

every day that passes brings Saddam one step closer to realizing his goal of a nuclear weapons arsenal, and that's why more and more your mission is marked by a real sense of urgency. You know, no one knows precisely when this dictator may acquire atomic weapons or exactly who they may be aimed at down the road, but we do know this for sure -- he's never possessed a weapon that he didn't use.

In his address to the nation on the eve of war on 17 January, President Bush again reiterated the nuclear dimension to US war objectives: coalition forces would "knock out Saddam Hussein's nuclear bomb potential."

### **Nuclear Attacks**

From the outset of the air war, Iraqi nuclear facilities were struck. On NBC's "Meet the Press" Sunday morning 20 January (Sunday evening Riyadh time), Gen. Schwarzkopf revealed the bombing of Iraq's nuclear facilities, and said, "I have a very high confidence that those nuclear reactors have been thoroughly damaged and will not be effective for quite some number of years." He added on ABC's "This Week with David Brinkley" the same morning that aircraft had "gone after" Iraq's "nuclear capability."

The attacks were reportedly directed at three main nuclear sites, including Iraq's

two nuclear research reactors -- the small 500 kw Tammuz-2 unit and the 5000 kw IRT-5000 unit. The main focus was clearly the single facility located at the Tuwaitha Nuclear Research Center, about 15 miles from Baghdad, and the location of the two reactors.<sup>478</sup>

On 23 January, Gen. Colin Powell stated at a Pentagon briefing summing up the first week of war that, "we've gone after the factories where Iraq has produced chemical and biological weapons, and until recently, continued working on nuclear weapons." He added, "with respect to nuclear weapons, we have targeted that nuclear facility they have very carefully. I have looked at the bomb damage assessment myself with trained analysts, and I think I can confirm for you that the two operating reactors they had are both gone, they're down, they're finished."<sup>479</sup> President Bush later that day said that allied attacks have "put Saddam out of the nuclear bomb-building business for a long time to come."

On 24 January, Marine Corps Maj. Gen. Martin L. Brandtner, Vice Director for Operations of the Joint Staff, was asked at the Pentagon briefing:

Q: Regarding the reactors that we're attacking near Baghdad, is there any indication of any reactive material being released into the atmosphere, or any chance of that?...

A: We seriously, of course, considered those effects as we planned our targeting against those facilities. We were very, very confident at the outset that there would not be significant result, and our indications to this point are that there have not been significant radiation problems.

Q: Can you explain how you did that?

A: I'm not going to discuss the methods by which we've determined that.

Q: You said significant. Was there any radiation released?

A: We have detected no perceptible radiation at this time.<sup>480</sup>

At the Riyadh briefing on 27 January, Gen. Schwarzkopf was asked: "Last week you told us that you had neutralized Iraq's nuclear capability...How far have you gone?" He responded, "Just to make absolutely sure that we are correct, what we said, I believe, is we have neutralized their manufacturing capability." He added, "I could never say that

there is no such thing as a nuclear weapon, although I think that most analysts have said there is not. But what we, in fact, said was that we have eliminated their manufacturing capability."<sup>481</sup>

Environmental consequences came up again at the Pentagon 29 January briefing. Lt. Gen. Kelly was asked about any signs of contamination in Iraq around the nuclear or chemical facilities. He responded, "The initial assessment I saw was that, if there was any, it would be very localized. Precisely what it is, I don't know -- I don't know the extent of it."<sup>482</sup>

On 30 January, Gen. Schwarzkopf, stated that the allies had targeted 31 nuclear, biological and chemical facilities, and that these had been attacked with over 535 sorties. Gen. Schwarzkopf stated that, "we are happy to report that we have destroyed all of their nuclear reactor facilities. Baghdad Nuclear Research Center [in Tuwaitha] has been level to rubble." He went on to describe the care of US targeting, and gave a 99.9 percent assurance of no contamination. No other details about damage to nuclear facilities were provided, beyond the statement that over half of all the nuclear, chemical and biological facilities had been "severely damaged or totally destroyed."<sup>483</sup>

### **Nuclear Contamination**

It still remains unclear how many nuclear-related facilities were actually attacked in the war, where Iraqi nuclear materials were, and whether these nuclear materials were safe during the air war. On 21 January, just a day after Gen. Schwarzkopf described for the first time the attacks on Iraq's nuclear facilities, the International Atomic Energy Agency (IAEA) stated that "attacks on Iraq's reactors probably did not create any radiation exposure hazard."<sup>484</sup>

The early assumption that no contamination was caused by bombing attacks on nuclear facilities is based upon US Defense Department statements that the facilities were "primarily" struck with Tomahawk cruise missiles and precision-guided weapons (laser-guided bombs) carried by F-117A stealth fighters, as well as by F-111 fighters, and possibly F-15E fighters.<sup>485</sup> All during the air war, US military spokesmen spoke of precise targeting of the nuclear reactors. The US targeted the facility "very carefully,"

Gen. Powell said on 23 January. "Precision-guided missiles and TLAM cruise missiles have struck hard," Gen. Schwarzkopf said on 30 January,

We have very carefully selected the destruction means after a lot of advice from a lot of very, very prominent scientists. We've selected the destruction means in such a way that we absolutely, almost to a 99.9 percent assurance, have no contamination....every one of those targets that we've attacked, we were very, very careful in the method of attack and the munitions used, to ensure that we didn't have any contamination.<sup>486</sup>

Yet Aviation Week & Space Technology reported on 22 April that, in fact, a massive (and seemingly disorderly and unsuccessful) attack by some 32 F-16 fighters carrying unguided general purpose bombs<sup>487</sup> preceded a later attack by F-117 stealth aircraft carrying laser-guided weapons:

One of the most heavily defended targets attacked was the nuclear research facility on the outskirts of Baghdad. The 1/4-mi. square complex was surrounded by an earthen berm, many calibers of antiaircraft artillery (AAA) and numerous SAM sites.<sup>488</sup>

According to a later Aviation Week report, "Smokepots around the facility obscured the target, and antiaircraft fire was too intense to linger in the area."<sup>489</sup> "They lofted bombs from a fairly great distance and did little damage with a large number of aircraft," Lt. Col. Robert Maher, commander of the 417th Tactical Fighter Training Squadron of F-16s, said.<sup>490</sup> According to the magazine,

Two nights later, four F-117As destroyed two reactors, damaged another and destroyed other buildings at the site. 'We were very thorough and made several trips,' [Lt. Col. Ralph] Getchell [commander of the 415th Tactical Fighter Squadron of F-117s] said. Damage after each sortie was assessed and used to plan the next sortie, to ensure there was nothing left to salvage.<sup>491</sup>

Iraq officially possesses 12.3 kilograms (27 pounds) of 93% enriched highly enriched uranium (HEU) in fuel rods that Iraq obtained from France for the Osirak reactor (which Israel destroyed before it became operational in 1981).<sup>492</sup> The Tammuz-2 reactor uses 93 percent enriched U-235. Iraq also has some smaller amounts



of 80 percent enriched U-235 and 36 percent enriched U-235 for the IRT-5000 reactor supplied by the Soviet Union. The country also reportedly has some 250 tons of natural uranium (10 percent enriched) acquired in the early 1980s.

The US believes that the research reactors were not operating at the time of attack, and that they had not been operating for some period prior to the war. It is unknown whether the fuel had been removed from the reactor or the cooling ponds. The total amount of nuclear materials contained in and around the reactors is estimated to be 15 kilograms, not including the safeguarded HEU. Any effects from the attack on the two reactors, according to one study, "would depend on the nature of the explosion -- the heat generated and how long the fireball lasted -- and on the weather....In order to project with confidence what the hazards are, much remains to be determined -- whether the reactor cores were in fact hit, whether they were loaded with fuel (the longer the fuel is used, the more radioactive it becomes), the weather at the time, etc."<sup>493</sup>

Even with the data provided by Iraq as part of its requirements under the ceasefire resolution, much is still unknown.

### **Targeting Chemical Facilities**

A total of 18 chemical weapons storage, research, and production facilities throughout Iraq were hit in the war. Chemical targets were hit on the first night, and chemical related attacks occurred nightly throughout the air war. By 30 January, two weeks into the air war, Gen. Schwarzkopf reported that 14 chemical and biological facilities had been damaged: "We have absolute confirmation that we've destroyed over 11 chemical and biological storage areas. We've also destroyed or heavily damaged three chemical and biological production facilities, and we're going to continue a relentless attack on this very, very heinous weapon system."<sup>494</sup> By 11 February, Lt. Gen. Kelly stated that "very, very, very little NBC [nuclear, biological, and chemical] production" was going on in Iraq.<sup>495</sup>

As the ground war neared, it was assumed in the press that Iraq had distributed chemical weapons to troops in Kuwait. Even before the war, the CIA Director Judge Webster, stated that chemical weapons had been moved into the occupied country.<sup>496</sup>

Before ground fighting began, the media was reporting that US intelligence had observed Iraq distributing chemical weapons to division commanders and field units, "apparently giving these leaders the authority to use them in ground combat..."<sup>497</sup> Gen. Sir Peter de la Billiere, the British commander, stated that Iraq had chemical weapons available and "were likely to use them" in the ground war.<sup>498</sup>

At war's end, it was still a mystery where Iraqi chemical weapons went. Brig. Gen. Neal stated on 11 February that chemical storage sites had been attacked in and around Basra in the south.<sup>499</sup> Numerous reports continued to circulate about the distribution of chemical weapons to delivery units, and about preparations to use weapons. There was one report at the end of the war of an F-117 stealth fighter attack during the second week of the air war against Iraqi bombers at Al Taqaddum air base while they "were being prepared for a chemical weapons attack."<sup>500</sup>

Although there were scattered reports after the war of discoveries of chemical weapons by Marines,<sup>501</sup> none were eventually found on the southern battlefield. It was finally concluded that chemical weapons never entered the combat theater.<sup>502</sup> "I don't have an explanation of why they haven't used chemicals during the retreat," Brig. Gen. Neal said on 26 February.

The air war was believed to have virtually wiped out Iraq's chemical weapons facilities, nullified Iraq's aircraft delivery means, and destroyed most of Iraq's chemical capable artillery guns and missile launchers. But this does not explain the absence of weapons on the battlefield. A number of explanations have been offered by military spokesman to explain their absence:<sup>503</sup>

- that the swiftness of the allied attacks prevented mobilization of chemical means by Iraq,
- that bad weather at the beginning of the ground war, particularly southerly winds that would have blown gas back at Iraqi forces, prevented their use,
- that gas didn't reach front-line troops because of interdiction of transportation during the bombing campaign,
- that the weapons deteriorated after 30-45 days, and that problems in production limited the shelf life of existing chemicals,

- that commanders in the field did not receive orders to use chemical weapons due to the disruption of communications, or that their orders were not passed to gunners,
- that Iraqi chemical protection equipment was inadequate, preventing the use on the battlefield, and
- that the means of delivery -- notably aircraft and artillery -- were prime targets and had been nullified.

On 28 February, Gen. Schwarzkopf stated that "some speculated" that if Iraq used chemical weapons, they would face nuclear retaliation. Perhaps the most interesting explanation was offered by Gen. Maurice Schmitt, French military chief of staff, who stated on 4 February that perhaps Iraqi generals did not use chemical weapons, despite orders from Saddam Hussein, because they knew that their use would be a gross violation of international law. This is not a theory that has been given too much credence by US military analysts. But one military source pointed out that in preparation for the ground war, leaflets were dropped on Iraqi forces warning that the use of chemical weapons would constitute a war crime.

#### **Chemical Contamination**

On 18 January, the chief of Soviet Chemical Troops warned that an attack on Iraqi chemical facilities would release dangerous concentrations of sarin and tabun, spreading to several dozen kilometers.<sup>504</sup> On 22 January, the Washington Times reported that a Czech chemical reconnaissance unit in Saudi Arabia detected trace quantities of chemical weapons in the air.<sup>505</sup> On 3 February, French military officials stated that the allies had detected traces of nerve gas fall-out as a result of allied bombing.<sup>506</sup> "We have found traces," Gen. Maurice Schmitt said on Channel 4 TV in the UK on 4 February. "We think that they could only come from chemical weapons and what we've picked up was along the border as well as in the sea." The same day, Marine Corps Maj. Gen. Robert Johnston, said that,

I would say to that report that we have, in attacking those targets, attacked them in such a way, and I can't give you all the technical aspects of it, to minimize the potential for that, for any of those toxins to go into the air. It's not to say that it

couldn't happen, but certainly with a view to minimizing, if not eliminating, any possible contamination of the surrounding areas. It's been done very carefully. I can't say that some may not be in the air and the immediate surroundings, but I suspect there would be no serious damage to any community.<sup>507</sup>

On 11 February, Brig. Gen. Neal repeated General Johnston's assurances. "We're targeting chemical plants and storage facilities," he said. "But we're doing it in such a manner that we're trying to make sure that there is no contamination by the application of munitions that we hope will limit any contamination. But let's be quite frank. We didn't put the storage point where they are [referring to Basra]. You've got to understand that. To try and jump to that we're callous, don't care about civilian casualties. I think that's the wrong approach."<sup>508</sup>

### **The "Baby Milk" Factory and the Targeting of Biological Weapons**

On 22 January, CNN reported that allied air attacks bombed an Iraqi baby formula factory in the region of Abu Ghuraib, causing significant damage.<sup>509</sup> The report was flatly denied by the Pentagon, who said that the facility was used for biological warfare. "It is not an infant formula factory," Gen. Powell said on 23 January, "no more than the Rabta chemical plant in Libya made aspirin. It was a biological weapons facility, of that we are sure -- and we have taken it out."<sup>510</sup> On 27 January, the US position changed somewhat, with Gen. Schwarzkopf saying that only a portion of the factory was used for biological warfare, and that was what was attacked.

We knew, in fact, that this particular facility we attacked was in fact what it was. We also used very precise munitions on it to make sure that we destroyed that part of it [the part the US thought was a biological warfare facility]...I reject the argument that was only a baby formula plant, but I would also clearly state that when we went after that facility we went after it in a precision way, damaged only that part of that facility that we knew or had a very, very high assurance as given to us by the intelligence community, that it was in fact a research facility for biological warfare.<sup>511</sup>

The US, in fact, then accepted that the factory did produce baby milk formula.

This was further confirmed on 5 February, when the Village Voice reported that "a Swiss spokesperson for Nestle, a leading manufacturer of infant foods, said 'We know this was a state-built infant-formula plant.' Company officials said they had regularly observed its construction in the last few years, 'because we like to be aware of the competition.'"<sup>512</sup> The French contractor, Pierre Guerin, who built the plant told the French newspaper Liberation that the plant produced infant formula.<sup>513</sup>

The US government continued to insist, however, that the plant was involved in germ warfare. But it certainly couldn't get its story straight. According to the Washington Post,

A White House official said the plant had been converted to germ warfare production last fall. An official at another US government agency said the plant originally was constructed as a biological warfare facility, but was a 'back-up' plant and was not in operation when it was attacked. An official at a third agency said the plant was not a full biological warfare facility but produced items that could be useful in the production of biological weapons.<sup>514</sup>

Asked on 20 March about whether the bombing of the factory was a mistake, Air Force chief of staff Gen. McPeak said, "Time will tell what kind of factory that factory was. There is no doubt that we made some mistakes about what we bombed."<sup>515</sup>

Retired Lt. Gen. Leonard Perroots, Director of the Defense Intelligence Agency until 1989 and a consultant to US intelligence during the war, stated on the BBC program "Panorama" on 25 March that the intelligence community had mistaken the huge milk vats at the factory for devices to mix chemical and biological compounds for military use. "We made a mistake," the General said.<sup>516</sup>

When reporters were again taken to the plant at the end of the war, it still had a large sign at entrance reading "Baby Milk Plant" in both Arabic and English. The factory was surrounded by barbed wire and observation towers, which the accompanying official stated was "the usual practice" with every factory.

Amid the mess of twisted tin roofing and charred chunks of insulation material were thousands of soft, one-pound packages of baby milk mix. Some of it was heaped in stacks that had been burned nearly beyond recognition....The packages

were printed with a logo that resembled a candelabra. Just outside the plant were dozens of steel storage tanks -- the kind one might see on a dairy farm -- imprinted with the same logo. Many of the tanks were badly damaged, apparently from the bomb blast....

As for the milk powder, reporters who took a package from the site and mixed it with their coffee said it seemed like the real article.<sup>517</sup>

The seemingly logical explanation of the attack is that the "pharmaceutical" compound within the larger industrial complex was indeed involved in biological weapons activity. US government spokesmen have not concluded that the attack hit the wrong facility. At the end of the war, in an interview printed in USA Today, Gen. Powell still insisted that no mistake was made:

Even after it was destroyed, some of the so-called baby powder that was around could not have been made there. We saw the packages and read the labels. It was made by a company that was not, to the best of our knowledge, doing business in Iraq. There was a body of evidence to suggest we knew what we were doing."<sup>518</sup>

This leaves the possibility that the US targeters indeed made a mistake, as Gen. McPeak suggests, and Gen. Perroots states. Perhaps one of the reasons is the assumption on the part of US intelligence that there was an active biological warfare program, with the subsequent targeting of 10 facilities.

Throughout the summer and fall of 1990, concern about Iraqi chemical and biological weapons capabilities mounted. The assumption that Iraq used chemical weapons against the Kurdish population was challenged by authoritative sources, but this questioning had little impact on the conclusion of the existence of the existing real chemical (and what would become the biological) threat.<sup>519</sup>

On 7 November 1990, Amb. Marjatta Rasi of Finland, chair of the UN Security Council Sanctions Committee, warned that pharmaceutical products being imported by Iraq for humanitarian purposes might be used to make chemical and biological weapons. Then, on 13 November, British Prime Minister Margaret Thatcher told the House of Commons that "We believe that [Saddam Hussein] also has biological weapons at his disposal."<sup>520</sup> After passage of UN Security Council resolution 678 on 29 November

authorizing "all necessary means" to expel Iraq from Kuwait, the British and French foreign ministers used identical language against "initiating the use of chemical or biological weapons."

In late December, the US and UK announced that soldiers would be inoculated against biological weapons, and that a crash program had begun to produce enough vaccine to protect US troops. For the next month, stories circulated about Iraqi anthrax, plague, and botulism capabilities. And it seemed that the US believed firmly that Iraq had biological weapons. President Bush, in fact, in his personal letter to Saddam Hussein on the eve of the withdrawal deadline, stated that "the United States will not tolerate the use of chemical or biological weapons..."

On 23 December, while in Saudi Arabia, Sec. Cheney gave a press conference where he was asked to elaborate about Iraqi capabilities. He stated:

We know certain things about his weapons of mass destruction....We know that he has been working to develop biological weapons. Our knowledge is less complete in that area and there is no evidence that he has any operational experience with biological weapons as there is not evidence that he used that capability in the war with Iran so we have less information on the status of those programs.<sup>521</sup>

The biological warfare issue finally came to a head on 23 January, when CNN reported from Baghdad that allied bombardment had struck the infant formula factory. Maj. Gen. Alex Hartley, the British Defence Ministry Deputy Director of Operations, said the same day that the Iraqi biological warfare facility at Salman Pak had also been extensively damaged. Oddly enough, on 28 January, Saddam Hussein said in an interview on CNN that the al-Hussein missile (a version of the SCUD) "can carry nuclear, chemical, or biological warheads."

On 30 January, Gen. Schwarzkopf revealed that 31 nuclear, chemical, and biological facilities had been bombed, including 10 specific biological facilities.<sup>522</sup> On 8 February, Iraq asked the United Nations to dispatch a fact-finding mission to determine whether the infant formula factory was a biological weapons facility. Its reports in response to the requirements of the ceasefire stated that no biological capabilities or facilities existed.

## **The Destruction of Iraqi Military Command and Control**

A paratrooper in southern Iraq with the 82nd Airborne Division stated somewhat sarcastically, and with some frustration, the day before the ceasefire that "if they knew they weren't going to fight, why didn't they settle it over the phone?"<sup>523</sup> It wasn't quite that simple.

The first priority in the air war was the destruction of Iraq's means of communications and military and governmental command -- the communications towers, relay stations, fixed communications nodes, command centers, and headquarters. Intelligence officials stated that Iraq had "one of the most robust and redundant communications systems in the world."<sup>524</sup> In the words of one Air Force officer, "We saw during the war that we placed the highest priority on targeting Iraq's C<sup>3</sup>I... [command, control, communications and intelligence]."<sup>525</sup>

The attacks on Iraq's command, control, and communications were comprehensive. Radio and television stations became military targets. Defense Department spokesman Pete Williams stated on 11 February that "It's not part of our operational theory that we should leave their radio stations on the air....We have done a lot to take their radio off the air....there are some low-power radio and television stations around the country that come on and off the air. We try to get to those as we can."<sup>526</sup>

Air attacks reportedly forced Saddam Hussein to shift communications away from the fixed network almost immediately. On 23 January, Gen. Powell stated at a Pentagon briefing that the Iraqi leadership "have not lost command and control of their forces or of the country" and was "still able to command their forces." Nonetheless, Gen. Powell said that whatever communications the Iraqis were managing were being carried "for the most part, on generator power, because we have taken care of the central power system within the city."<sup>527</sup> A week later, Gen. Schwarzkopf stated that as a result of having completely destroyed one-third of Iraq's command and control facilities, "Saddam Hussein and the Iraqis have been forced to switch to backup systems, and those systems are far less effective and more easily targeted."<sup>528</sup> On 11 February, the New York Times reported that intelligence officers believed that they had so severely disrupted Iraqi communications "that it takes 24 hours for President Saddam Hussein to get a



message to the front by reasonably secure means."<sup>529</sup>

By the start of the ground war, Iraqi military communications had been completely disrupted, and Iraqi operations were disorganized and piecemeal. "After being bombed for 41 days," one official told the Washington Post, "he's basically blind."<sup>530</sup> Aviation Week & Space Technology concluded in March that, "the continued air attacks reduced Iraq's command and control structure so greatly that Iraqi President Saddam Hussein and his military commanders were unable to control the country's forces effectively."<sup>531</sup>

As coalition forces advanced on the ground, they not only took huge numbers of Iraqi prisoners, but also encountered units that seemed to be completely cut off from any communications or control from the outside. It was clear that many Iraqi units were unaware of Baghdad's order to withdraw, and later found themselves equally ignorant of the existence of a ceasefire. Iraqi soldiers who surrendered said that they had been out of communication with their commanders since the early days of the air war.<sup>532</sup>

The destruction of fixed communications means in Iraq, and the disruption of military command within Iraqi forces, became particularly important as the war came to an end and the pace of military operations, particularly ground operations, accelerated. On 22 February, the White House delivered its final ultimatum for Saddam Hussein to withdraw his forces from Kuwait by noon Saturday 23 February, the only way to forestall a ground war. Marlin Fitzwater stated that "the United States and its coalition partners reiterate that their forces will not attack retreating Iraqi forces." "If he's really serious about getting out," Lt. Gen. Kelly had said earlier in the week "he can get out in seven days. If he can't drag all his dead tanks out with him, too bad."

At 1735 EST, on 25 February, after the deadline for withdrawal had passed, Baghdad Radio announced that Iraq's "Foreign Minister informed the Soviet ambassador... practical compliance with UN Security Council Resolution 660," and that Saddam Hussein had ordered his troops to make a fighting withdrawal from occupied Kuwait and return to the positions they occupied before the 2 August 1990 invasion. The White House immediately responded, stating that there was "no evidence to suggest the Iraqi army is withdrawing. In fact, Iraqi units are continuing to fight...We continue to

prosecute the war. We have heard no reason to change that....Saddam Hussein must personally and publicly accept explicitly all relevant UN Security Council resolutions."

On 26 February, Saddam Hussein announced on Baghdad radio that Iraqi troops had begun withdrawing from Kuwait, and that the withdrawal would be complete that day. President Bush reacted calling Hussein's speech "an outrage. He is not withdrawing. His defeated forces are retreating. He is trying to claim victory in the midst of a rout, and he is not voluntarily giving up Kuwait. He is trying to save the remnants of power and control in the Middle East by every means possible and here, too, Saddam Hussein will fail. Saddam is not interested in peace, but only to regroup and fight another day, and he does not renounce Iraq's claim to Kuwait." As US and coalition ground forces moved forward, Iraq complained bitterly that "the enemy is still interfering in the withdrawal of our forces...."<sup>533</sup>

#### **Massacre at al-Mutlaa Ridge and the "Highway to Hell"**

An objective of US ground forces was the town of al Jahra, at the head of Kuwait Bay, and the junction of the roads exiting Kuwait City (the 6th Ring Road and the Jahra Road). When Marine Corps aircraft flying close air support for ground troops arrived on the scene, there was a five-vehicle wide stream of Iraqi vehicles moving on the highway out of Kuwait City. The Marines let the mass of vehicles get out of the city before attacking, and laid down an aerial barrage of anti-armor mines across the road to halt the convoy. Kill zones were then assigned to groups of eight aircraft sent into the target area every 15 minutes. "It was a turkey shoot for several hours, then the weather turned sour," Maj. Gen. Royal N. Moore, commander of Marine Air Wing 3, said.<sup>534</sup>

The 2nd Marine Division and its augmenting armored brigade (the "Tiger" brigade) of the Army's 2nd Armored Division, was one of the first ground units to arrive on the scene 26 February. The units had received new orders on the morning of the 26th. "The intent is to block enemy forces from withdrawing into Iraq," the radio message said. Tiger brigade was ordered to "race across the desert and be in place before nightfall" on Tuesday the 26th.<sup>535</sup>

According to one report, "The Iraqis were left with one way out of Kuwait, via

Basra, and the two roads rapidly developed into a choke point because the surrounding land is marshy."<sup>536</sup> US troops observed "thousands of Iraqis trying to escape up the highway"<sup>537</sup> and "attacked from the high ground and cut to shreds vehicles and soldiers trapped in a two-mile nightmare traffic jam."<sup>538</sup> A pool reporter with US forces observed, "a vast traffic jam of more than a mile of vehicles, perhaps 2,000 or more...formed behind it. Allied jets [which had started their attacks on 25 February]...repeatedly pounded the blocked vehicles."<sup>539</sup> Another pool reporter wrote that "the men of the Tiger Brigade controlled two cloverleaf highway interchanges and had sealed off the most direct route between the capital city and Iraq...[Army Col. John] Sylvester [commander of the Tiger brigade] said he had spoken to Marine Gen. Walter Boomer about the push north and Boomer passed along a message from allied commander Gen. H. Norman Schwarzkopf "not to let anybody or anything out of Kuwait City."<sup>540</sup>

A pool reporter with the 2nd Armored Division observed the scene on 27 February:

As we drove slowly through the wreckage, our armored personnel carrier's tracks splashed through great pools of bloody water. We passed dead soldiers lying, as if resting, without a mark on them. We found others cut up so badly, a pair of legs in its trousers would be 50 yards from the top half of the body. Four soldiers had died under a truck where they had sought protection.<sup>541</sup>

On 2 March, a New York Times reporter visited the same area. "Mangled cars, trucks, and tanks" stretched for seven miles:

From the track marks and the position of the wrecks, it appeared that when F-16 fighter-bombers came in to strafe the column, some of the 1,500 vehicles attempted to turn around and drive back to Kuwait against the current of oncoming traffic.

In the effort to back out, some of the Iraqi soldiers opened fire on fellow troops blocking their path, said American soldiers who took part in the artillery assault. They reported that in the deadly confusion, many Iraqis fled through the desert toward the American positions, their hands raised.<sup>542</sup>

Another reporter observed a week later,

Vehicles of all varieties were strewn over the road, the shoulder, the desert, rammed into one another, overturned, simply abandoned. Not just tanks and sedans but a red fire engine, an ambulance, a blue-and-white police car somebody had fancied, a red Mercedes...A dump truck and a bright red fire truck had collided with one other.<sup>543</sup>

An artillery officer observing the road on 2 March said that, "This is probably the worst carnage in the Kuwait theater of operations."<sup>544</sup>

The "massive, disorderly Iraqi retreat" extended north of Jahra, where the two roads going into Iraq split at al-Mutlaa. The main road was "so jammed with tanks and other armored vehicles that Iraqi troops and vehicles were being diverted along a second, coastal route."<sup>545</sup>

According to one report, "In particular, the coastal road, running north from...Jahra to the Iraqi border city of Umm Qasr, was [according to an Army officer on the scene] 'nothing but shit strewn everywhere, five to seven miles of just solid bombed-out vehicles.' The U.S. Air Force, he said, 'had been given the word to work over that entire area, to find anything that was moving and take it out.'<sup>546</sup> A Navy A-6 pilot observed that the convoys were spaced by less than 50 meters. "It's a 20-mile nose-to-tail jam."<sup>547</sup>

Air attacks by fighter and bomber aircraft carrying cluster bombs destroyed armored vehicles and trucks, hijacked buses, and stolen cars, and caused countless secondary explosions of ammunition. Strafing attacks were directed at both convoys on the road, and at vehicles that tried to escape from the carnage into the desert. B-52 bombers were also brought into the attack to drop cluster bombs "against Iraqi tank columns strung out along the highways leading north out of Kuwait."<sup>548</sup> It was "like shooting fish in a barrel," one naval aviator remarked. They were "basically just sitting ducks."<sup>549</sup>

The air attack was intense and seemingly disorderly. Naval aircraft flew 660 combat missions during the last full day of the war, "as they chased the retreating Iraqi armies out of Kuwait and into the trap sprung by ground forces...," Navy Times

reported.<sup>550</sup> According to a pool report filed on 27 February, "One Navy pilot, who asked not to be identified, said Iraqis have affixed white flags to their tanks and are riding with turrets open, scanning the skies with binoculars. The flier said that under allied rules of engagement, pilots were still bombing the tanks unless soldiers abandoned the vehicles and left them behind."<sup>551</sup>

Night attacks on 25 February extended into daylight and "pilots leaving pre-flight briefings had to get fresh instructions as they walked to their planes."<sup>552</sup> Aboard the aircraft carrier USS Ranger, "Air strikes against Iraqi troops retreating from Kuwait were being launched so feverishly...that pilots said they took whatever bombs happened to be closest to the flight deck."<sup>553</sup> S-3 Viking anti-submarine patrol aircraft were brought into the bombing campaign, carrying cluster bombs.<sup>554</sup> The number of attacking fighter aircraft was so dense that air traffic control had to divert planes to avoid collisions.<sup>555</sup>

Reporter Michael Kelly, went out to the coastal road, which he described as a "skinny two-lane blacktop," and described the scene on 10 March:

For a fifty- or sixty-mile stretch from just north of Jahra to the Iraqi border, the road was littered with exploded and roasted vehicles, charred and blown-up bodies...The road was thick with the wreckage of tanks, armored personnel carriers, 155-mm howitzers, and supply trucks filled with shells, missiles, rocket-propelled grenades, and machine-gun rounds in crates and belts. I saw no bodies that had not belonged to men in uniform. It was not always easy to ascertain this because the force of the explosions and the heat of the fires had blown most of the clothing off the soldiers, and often too had cooked their remains into wizened, mummified charcoal-men.<sup>556</sup>

After the ceasefire, Iraqi soldiers and deserters picked through the wreckage near the fluid border between allied and Iraqi forces, scrounging among their dead countrymen, looking for dog tags to give to families back home. "The horizon is a pastiche of bones and empty boots," an Associated Press reporter wrote. "Plastic wrappers from the Kuwait Cheese Co. flit in the breeze....Casings of Hellfire anti-tank missiles lay imbedded in the sand. Corpses...resembled marble sculptures. Wild dogs circled their rigid prey, growling at the soldiers, who worked slowly. The men stopped

often to place their faces inside handkerchiefs."<sup>557</sup> The wrecked exodus was flowing over with electronic equipment and appliances, jewelry, clothing, toys, all sorts of booty of war stolen by Iraqi forces.<sup>558</sup>

The highway to the Iraqi border was eventually cut in a number of places by air attacks, and ground units of the 1st and 2nd Marine Divisions, as well as the British 1st Armored Division further to the north, participated in the various attacks. Thousands of retreating troops, 25,000 Iraqi soldiers according to an estimate circulating in the Army, were eventually killed.

After the war, Gen. McPeak was asked about attacks on retreating troops, and stated that "When enemy armies are defeated, they retreat...It's during this phase that the true fruits of victory are achieved from combat, when the enemy's disorganized. The alternative is that we should never attack a disorganized enemy...If we do not exploit victory, the President should get himself some new generals."<sup>559</sup> McPeak, however, insisted that the US went to considerable lengths to "keep from killing people." "We made it clear that our targets were equipment targets. We said in our leaflets that were dropped, move way from your equipment, you'll be safer. We said we will not attack anybody walking north, and we didn't. We attacked equipment in every case. So I think we tried to disarm the Iraqi Army as humanely as possible."<sup>560</sup> McPeak further justified the necessity of allied actions in an interview on 20 March: "Our obligation is to our young men and to end the war as rapidly as possible. That often requires that we be very brutal. War is a brutal thing."<sup>561</sup>

### **The Post-Ceasefire Massacre**

Early in the morning on 1 March, on the third day of the ceasefire, a convoy of Iraqi vehicles was reported moving north through the demarcation point of allied operations on Highway 8 about 50 kilometers west of the city of Basra, near the Rumalia oil fields. According to a pool report from the UPI, a platoon of the 24th Infantry Division reported that the "massive Iraqi convoy...had just shot a couple of rockets at it."<sup>562</sup> The Iraqi convoy of some 700 wheeled vehicles and 300 armored vehicles, according to a Washington Post report, "opened fire in an effort to clear a path toward a

causeway across the Euphrates."<sup>563</sup>

The battalion commander, Lt. Col. Chuck Ware, "promptly got permission from the chain-of-command of the...division to return fire...[and] the fight promptly escalated with Ware's [the commander's] battalion receiving backup from Army artillery and 20 U.S. Cobra and Apache attack helicopters."<sup>564</sup> According to the Washington Post:

A Cobra helicopter gunship firing TOW missiles blocked the causeway by knocking out the lead vehicle. Then a two-battalion task force swept into the refinery area from the south, split into two columns and ripped up the spine of the fleeing Iraqi motorcade.<sup>565</sup>

US tanks were "shooting Iraqi tanks off of heavy-equipment trailers trying to haul them to safety. Bradley fighting vehicles shattered truck after truck with 25mm cannon fire as Iraqi civilians and soldiers alike ran into the surrounding marshes."<sup>566</sup> For "mile after mile," the Washington Post reported, "the attacks left a pyre of burning tanks, personnel carriers and trucks, U.S. soldiers later noticed thousands of footprints in the mud where fleeing Iraqis, for reasons unknown, had pulled off their boots and scampered in the reeds to hide."<sup>567</sup> "Smoke and flames rose from hundreds of pulverized Iraqi tanks and trucks," the pool report stated; "They shot first. We won big," the battalion commander said.<sup>568</sup>

In less than two hours, 187 Iraqi armored vehicles, including 25-50 T-72 tanks, and more than 350 military trucks, were destroyed.<sup>569</sup> One US tank and one armored vehicle was damaged; there was one US casualty, a soldier wounded by shrapnel. Army sources state that some 2,000 Iraqi soldiers died; the pool report stated that "Iraqi civilians were caught in the crossfire...Army medics waded through a crowd of about 30 [surviving] civilians, some tending wounds...A reporter seeking to talk with the medics was promptly escorted away by two U.S. military officers. 'No interviews,' one said."<sup>570</sup>

"I guess they were just trying to get out of the way," one US soldier said.<sup>571</sup> "Maybe they didn't know there was a ceasefire. Maybe they didn't care," the battalion commander stated. "But we know that Saddam Hussein can't be trusted."<sup>572</sup> Maj. Gen. Barry McCaffrey, commander of the 24th infantry division, according to UPI, said that many Iraqi soldiers "may have been unaware of the ceasefire because U.S. forces

destroyed their lines of communication."<sup>573</sup>





## The Laws of Armed Conflict and Protection of the Environment

From the moment Iraq invaded Kuwait, the law was always present. "International law," and the prevailing "practice of states,"<sup>574</sup> formed the backdrop for justifying the use of force. The embargo and military action were justified on the basis of Iraqi breaches of international law, and as war began, the US affirmed to Iraq its intention of operating in accordance with the laws of armed conflict.<sup>575</sup>

Violation of Kuwait's borders and its sovereignty became a crime that had to find punishment. Iraq's behavior during its occupation was similarly condemned, and talk of "war crimes" filled the air. All through the war to eject Iraq from Kuwait, the rules of armed conflict, formed the basis for the allies' moral conduct, as well as for their condemnations of Iraq's treachery and destruction.

The existing customary rules of armed conflict, often called the international humanitarian laws, or the laws of war, began to be codified in the 19th Century. They can be found in the various Hague and Geneva Conventions as well as in subsequent treaties and statements. The laws are numerous and complex, the four Geneva Conventions of 1949 and two Geneva Protocols of 1977 alone contain 559 articles, "comparable in complexity to the Internal Revenue Code of the United States."<sup>576</sup> The Hague Conventions, written earlier, generally deal with the means and methods of warfare, and delineate some restrictions on the targets and objects of attack. The Geneva Conventions deal with the humanitarian aspects of the law of armed conflict, concerning, for example, the proper treatment of prisoners and wounded. The modern Geneva Protocols of 1977 attempt to bring together the two streams of the Hague and Geneva Conventions -- means and methods and targets and objects, with the humanitarian laws.

The function of the laws of armed conflict, according to the US Air Force, "is essentially inspired by the humanitarian desire of civilized nations to diminish the effects of conflicts."<sup>577</sup> Through a complex maze of conventions, treaties, and statements, the law creates rules based on a series of principles, the most important of which are the distinction between combatants and non-combatants, and the conditions for avoidance of

unnecessary suffering.<sup>578</sup> The principles of proportionality and discrimination underlie the rules. One suggested summary is that "proportionality" is the essence of the principle of military necessity, and "discrimination" or non-combatant immunity, is one element of the principle of humanity.<sup>579</sup> Assumed in the concept of military necessity is the "most fundamental" principle of the law of armed conflict, "that the right of belligerents to adopt means of injuring the enemy is not unlimited."<sup>580</sup>

During the Gulf war, there was little disagreement between the allies and Iraq, or in the international community, as to the proper standards of behavior for humanitarian conduct during the occupation of Kuwait, or for treatment of prisoners of war, even though there may be disputes as to whether those standards were being violated.

### **The Concept of Military Necessity**

It is in the interpretation of military action, and specifically the concept of "military necessity" (the anticipated military value of one's own action), that there is significant international disagreement as to proper conduct during war. Military necessity is not defined anywhere in the laws of war, but it is intertwined with proportionality and discrimination, the central principles of the "just war" tradition. But also assumed is the doctrine that the law of armed conflict exists to humanize the conduct of warfare, not to put actual restraints on its very existence.

The most extensive discussion of military necessity exists in manuals of the US Defense Department and the military services. The US Air Force, for instance, says that Military necessity is 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....Complementing the principle of necessity and implicitly contained within it is the principle of humanity which forbids the infliction of suffering, injury, or destruction not actually necessary for the accomplishment of legitimate military purposes. This principle of humanity results in a specific prohibition against unnecessary suffering, a requirement of proportionality and a variety of more specific rules...The principle of humanity also confirms the basic

immunity of civilian populations and civilians from being objects of attack during armed conflict.<sup>581</sup>

Military necessity has also become the main justification for deviation from restrictions in customary law. The most classic expression of this exception is the 1907 Hague Regulations (Article 23(g)), prohibiting the destruction or seizure of the enemy's property "unless such destruction or seizure be imperatively demanded by the necessities of war." Military necessity, nonetheless, "has been rejected as a defence for acts forbidden by the customary and conventional laws of war because such laws have, in any case, been developed with consideration for the concept of military necessity."<sup>582</sup> Thus, military necessity is not unrestricted, even if there is much disagreement as to the proper conduct of war.

It is important to understand, however, that there are very few absolute or unconditional prohibitions in the conduct of war. Instead a consideration of proportionality is required. For example, the US government's formulation of customary law is that there is no absolute prohibition on attacking targets if civilians are present: "The presence of non-combatants within or adjacent to a target does not...preclude its attack," the Navy's international law manual states.<sup>583</sup>

Nevertheless, the effect of the bombing campaign on the country of Iraq seemed to challenge a level of acceptance in that it evoked protests from foreign leaders and governments soon after the air war began. On 28 January, Soviet foreign minister Alexander Bessmertnykh said in Washington that "we've got to be careful about the scale of the military operation so that the...civilian population of Iraq and the city itself [Baghdad] do not become victims of what is happening....There may be a danger of the conflict going more in the direction of the destruction of Iraq...and we've got to try and avoid it." Soviet criticism moved US Sec. of State James Baker to accede to a joint Baker-Shevardnadze statement in Washington, one that reiterated that the US objective was not the destruction of Iraq, but only its military forces. This is a restatement of one of the oldest rules of the laws of war, found in the St. Petersburg Declaration of 1867 (see Appendix B).



## **Air Warfare, the Laws of War, and Legitimate Targets**

Operation Desert Storm was largely an air war and it was air delivered weapons that inflicted most of the destruction. Air attacks placed a greater range of targets and supporting infrastructures in reach of military force. Indeed as the Air Force manual on international law notes, since the advent of air bombardment, "the scope of lawful 'military objectives' has been enlarged."<sup>584</sup> The advent of stand-off munitions and smart weapons has, in addition, created the capability to carry out military operations near or within civilian areas behind conventional battle lines. Such operations intrinsically stress the ability to maintain a traditional distinction between combatants and non-combatants.

Yet aerial warfare is one area of warfare that still has no convention exclusively devoted to it. The customary rules of bombardment in the Hague and Geneva Conventions restrict attacks on hospitals, hospital ships, churches, and protected buildings of religious or historic nature, as long as they are not used for military purposes.<sup>585</sup> With the advent of air warfare, in 1923, an attempt was made to adopt specific Rules of Air Warfare to augment these restrictions. Jurists meeting in the Hague codified a number of principles, most of which are accepted by the US as customary law, even though the Rules were never formally adopted.<sup>586</sup> There were in fact, several failed attempts in the 1920s and 1930s to ban military aircraft or aerial bombardment that failed.<sup>587</sup>

The Hague Rules acknowledged the new long reach of air warfare, as demonstrated in the First World War. The rules give a list of legitimate targets (Article 24): "...bombardment is legitimate only when directed at the following objectives: military forces; military works; military establishments or depots; factories constituting important and well known centers engaged in the manufacture of arms; ammunition or distinctively military supplies; lines of communications or transportation for military purposes." The Hague Rules thus describe a set of targets which are in fact the core of US Air Force strategic bombardment doctrine.

There are, however, minor differences between the targets specified as legitimate military objectives in air warfare in current military manuals (and practices), and the

Hague Rules. Military objectives are defined widely by the US Defense Department, for example, as those that "effectively contribute to the enemy's war-fighting or war sustaining capability." This includes military and civilian targets (called economic targets by the military) -- "Proper economic targets for attack include enemy lines of communication used for military purposes, rail yards, bridges, lighters, industrial installations producing war fighting products and power generation plants. Economic targets of the enemy that indirectly but effectively support and sustain the enemy's war fighting capability may also be attacked."<sup>588</sup>

The US military concept of "economic targets" is an expansion of the original Hague Rules conception. The contemporary list includes power generation plants, as well as civilian "leadership" targets, targets which the Hague Rules did not specify. Through the practice of the Second World War, and now the Gulf War, air warfare has expanded beyond the specific constraints envisaged in 1923. Air warfare doctrine has thus developed much quicker than the law of armed conflict; it now rests at the point where virtually any target -- military or civilian -- may be destroyed if military necessity (now liberally defined in war plans as the enemy's ability to fight or sustain a war) can be demonstrated.

Outside of a limited range of restricted objects, therefore, everything is fair game.<sup>589</sup> Since the conclusion of the Hague Rules, international law has not attempted to continue the process of defining allowed targets. When the Geneva Protocols were negotiated in the mid-1970s, they did not attempt to list what could be attacked; instead they developed a definitional test for military commanders to justify their choices of targets. The Geneva Protocols, thus provides for first time a definition of "military objective." Article 51 defines civilian objects as all those that are not military objectives. Paragraph 2 gives a two part test. First, an object must make "regular, direct and significant support" to military action through factors such as its nature, location, purpose, or use, to be a military objective. Second, destruction of such an object must offer "definite military advantage."

Under the Geneva Protocols, the test of proportionality is also twofold. In attacking a military objective, everything must be done to minimize civilian casualties

(Article 57, Para. 1); and attacks should be avoided if the loss of civilian life is such that it is "excessive in relation to the concrete and direct military advantage anticipated" (Article 57, Para. 2).

These two part tests are important, as there are objects that could be military objectives, but destroying them might not offer a "definite military advantage." Professor Hamilton DeSaussure points out that, "In the Falklands War for example, it might have been a military objective to hit a personnel depot in the heart of Argentina, but it would not have been a distinct military advantage with respect to the reoccupation of the Falklands Islands."<sup>590</sup> While adopting this approach to evaluating US targeting may well yield dubious targets, this test is an example of the relatively rarified nature of the legal debate.

Against this background it was not surprising that there was little questioning of the choice of targets being attacked. When reports came in of civilian lives being lost in the bombing campaign, the focus became the adequacy of the care being taken by targeters and pilots to avoid "collateral damage," that is, the unintended deaths of civilians in attacks on otherwise legitimate military objects. Rarely was it understood that many civilian targets were themselves a part of the attacks. Rarely was it questioned whether all of the targets were necessary or justifiable to achieve the immediate military objective. There was little recognition that targeting information might have been faulty, and therefore that some civilian targets might have been hit by mistake.

The issue of restricted, versus allowed targets, first came to light with reports on 22 January of attacks on the "Baby Formula" cum biological weapons facility. The evidence now indicates that the US probably made a mistake in the attack. Again with the bombing of the Amiriya shelter in Baghdad on 13 February, it became clear, through the strong defense of US action, that the target, on closer examination, did not pass the test for a military objective. US officials were said to be "shaken by the deaths of Iraqi civilians," and had "ordered intensive studies of methods to avoid the repetition of such an incident."<sup>591</sup>

From the very beginning of the fighting, US war goals focused not only on the



overall objective of liberating Kuwait, but also on destroying Iraq's military machine. As British Foreign Secretary Douglas Hurd said on 20 January, bombing was reducing Iraq weapons stocks, and although this was not the allies "original objective...it's clear that he is not going to emerge from this with anything like the kind of military machine that he went into it with..." Sec. Cheney said on 21 January that "Our objective is to get rid of Saddam Hussein in terms of his presence in Kuwait, and also to destroy his offensive military capability."<sup>592</sup> On 8 February, Cheney said that, "We believe that it is far better in the end, and it will be far less costly for the United States and our allies to deal with the threat that Saddam Hussein represents now than to wait five or six or ten years when he has nuclear weapons, weapons of mass destruction."

The expanded mission of destroying Iraq's military (and military industrial) capacity, ultimately guided the selection of industrial and research and development facilities, even though they played a negligible role in any short war, and their continued operation even during a war could not be reasonably expected to have any impact on Iraq's military performance.

The bombing of research and development facilities, for instance, was specifically justified by the allies under the restoration of "peace and security in the region" objective set out in UN Security Council Resolution 678. Lt. Gen. Horner told Air Force Times, "their existence threatens the long-term stability of the region."<sup>593</sup> Gen. Powell stated on 23 January that the justification for hitting "specific campaign targets" was to "make sure that when this is all over, the kind of threat that has existed in the region is quite different than the threat that existed before it began."<sup>594</sup> But Gen. Powell admitted that destruction of these facilities did not relate to the primary objective of ejecting the Iraqi army. "This is a target category that we will go after at our leisure over time. We're in no hurry."<sup>595</sup>

The air war was also intended to have a wider effect on the Iraqi people than just ejecting its army from Kuwait. US officers said that an intent of the bombing was to achieve a psychological effect on the Iraqi people. Lt. Gen. Horner told Air Force Times on 18 March that "middle-of-the-night bombings of targets in Baghdad" were intended to remind Iraqis that a war was going on and Saddam was vulnerable and

unable to stop it. "We hit the electrical production to invoke hardship on military command and control, to stress it," Horner said. "But there's no doubt that was a reminder that Saddam Hussein was conducting a war in the south" and was unable to contain it.<sup>596</sup>

### **Laws Protecting the Natural Environment**

The Hague Conventions II of 1899 and IV of 1907 have some incidental measures which are relevant to protecting the man-made environment, but protection of the environment was never their objective. "Wanton destruction" unrelated to military objectives is prohibited, as is "pillage." The Conventions specify that during hostilities forces must refrain from attacking certain objects, such as medical facilities and religious objects. The Conventions commit an occupying state to safeguard public buildings, real property, forests, and agricultural works.

It is only since the experience of the Vietnam War that specific relief for the natural environment has become apparent in international law. The Geneva Protocols of 1977 codified the principle that the natural environment should be protected from the conduct of warfare and its effects. The Protocols generally merged two major streams of international law relevant to the protection of the natural environment in warfare; one which limits the effects of warfare on the environment (laws relating to the protection of targets, persons, places, and objects); and the other which prohibits using the environment as a destructive tool of warfare (rules, prohibitions, and limits on specific weapons, means and methods of warfare).<sup>597</sup>

The Geneva Protocols also developed a new principle specifically aimed at the natural environment (Article 35): "It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment." Added to the list of traditionally prohibited targets like hospitals are installations containing "dangerous forces" such as dams, dikes, and nuclear electric power generating stations. The Protocols state that they must not be attacked if the attack could result in severe losses among the civilian population. Also, objects essential to the survival of the civilian population, including foodstuffs and

agriculture, are prohibited from attack.

It is telling from the point of view of current environmental protection in war, that the US holds the right to bombard "geographic targets" like mountain passes for military purposes. Moreover, Italy, the UK, the Netherlands, and New Zealand all filed reservations to Protocol I, arguing that an undefined area of land may be a "military objective" liable to attack.<sup>598</sup>

In 1977, the Environmental Modification (ENMOD) Convention was concluded, also provoked by experiences in the Vietnam War. ENMOD is concerned with using techniques to manipulate natural forces for military effect. ENMOD contains a similar formulation on protection of the environment found in the Geneva Protocols. The negotiation of the ENMOD led to a debate about prohibiting the use of herbicides and other chemical agents, but these specific prohibitions are not included in the Convention. Nonetheless, the US has renounced first use of such agents in all but minor applications.<sup>599</sup>

The overlapping categories of legal instruments that can be interpreted as protecting the environment (discussed in more detail in Appendix A) include:

- Protection of certain classes of targets from conduct of warfare (Geneva and Hague Conventions, Geneva Protocols I and II of 1977, Hague Cultural Property Convention);
- Protection of specific regions from warfare and armaments (Antarctica Treaty, Treaty on the Moon and Celestial Bodies);
- Prohibition of nuclear arms and warfare from specific areas (Treaty of Tlatelolco, Treaty of Rarotonga);
- Prohibition of the use of chemical and biological weapons, and of the possession of biological weapons (Geneva Protocol of 1925, Biological Weapons Convention).
- Prohibition on the use of certain kinds of weapons on the battlefield (Inhumane Weapons Convention).<sup>600</sup>
- Restriction on manipulation of natural forces for military purposes (Environmental Modification Convention);
- Protection of certain classes of biota from warfare (Convention for Protection

of Birds, Genocide Convention);

- Protection of specified natural and cultural areas of outstanding value from warfare (World Heritage Convention);

- Regulations or prohibitions on the discharge of dangerous civil and military waste into the environment (London Dumping Convention, Antarctica Treaty, Outer Space Treaty); and

- Protection of the entire natural environment from war (World Heritage Convention).

While a number of principles relate to protection of the environment during warfare, they are all subordinated to the principle of military necessity.<sup>601</sup> Even in the Geneva Protocols, the new basic rule on protecting the natural environment (Article 35) is later subordinated to military necessity. Article 55 states that "Care shall be taken in warfare to protect the natural environment" (emphasis added), accepting that environmental protection is not absolute. Despite acknowledgement of the environmental effects of warfare, Richard Falk wrote in 1984, "to turn to international law for relief provides only the most scant basis for hope at present....What is militarily attractive remains permissible, or at least not explicitly prohibited, whereas that which is of no evident relevance to war making is diligently proscribed."<sup>602</sup>

### **US Objections to the Geneva Protocols**

The Geneva Protocols are the most important instruments relating to the conduct of warfare and the natural environment, providing protections not previously found in the law. Significantly, having been actively involved in the negotiation of the Protocols from 1974-1977, the US is not party to Protocol I, nor are most of the key active coalition allies -- France, or the UK -- who participated in the war.<sup>603</sup>

The US (and most western military powers') rejection is rooted in the concept of military necessity. The US government's position is that Article 35 is not part of customary law.<sup>604</sup> The objection centers on the language of Article 35 of Protocol I, which prohibits acts that would have "widespread, long term and severe damage," while not defining these effects in the text. During the most recent debate about the Protocols

in 1987, Michael J. Matheson, Deputy Legal Advisor in the US State Department, reiterated that US objection:

We, however, consider that another principle in Article 35, which also appears later in the Protocol, namely, that the prohibition of methods or means of warfare intended or expected to cause widespread, long-term and severe damage to the environment, is too broad and ambiguous and is not part of customary law.<sup>605</sup>

One opponent of the Protocols argued that Article 35 was objectionable, as it would open the door for war crimes prosecutions whenever the environment suffered serious incidental damage.<sup>606</sup> However, an advocate of the Protocols, its US negotiator, Ambassador George Aldrich, argued that "collateral damage from conventional warfare, even in very severe damage such as that which occurred in France in World War I was not intended to be covered...[L]ong term should be understood in terms of decades."<sup>607</sup> Another authoritative interpretation takes the view that Article 35 "will not impose any significant limitation on combatants waging conventional war," and that the article was aimed at unconventional warfare, chemical agents, or herbicides.<sup>608</sup>

The US also does not support, nor consider customary international law, the new restrictions contained in the Protocols (Article 52) on attacking dangerous works and installations.<sup>609</sup> The Joint Chiefs of Staff conducted a study of the military implications of Protocol I, concluding that it was "militarily unacceptable" because of new restrictions on objects of bombardment (as well as for other reasons). Abraham Sofaer, State Department Legal Adviser, wrote that the new law "would protect objects that would be considered legitimate military objectives under customary international law." Sofaer argued that the Protocol would provide almost complete prohibition, and exempt such targets from the traditional considerations of proportionality:

It is clear...that civilian losses are not to be balanced against the military value of the target. If severe losses would result, then the attack is forbidden, no matter how important the target. It also appears that Article 56 forbids any attack that raises the possibility of severe civilian losses....<sup>610</sup>

Air Force and Navy international law manuals written after the signing of

Protocol I do not discuss any constraints on warfare related to the natural environment. The Defense Department's own "Checklist" for operational planning consistent with international law contains little that is relevant to environmental damage caused in war. There is nothing about the need to protect the natural environment, and lists of prohibited targets do not include chemical factories, nuclear facilities, or oil wells. The checklist for operational planning does refer several times to the ENMOD convention, specifically in relation to the use of chemical weapons, but there is nothing about the natural environment per se.<sup>611</sup>

The US does accept as customary law, as codified in Protocol I, the prohibition on the deliberate starvation of civilians, and the intentional destruction of food, crops, livestock, and other objects indispensable to the survival of the civilian population if the specific purpose is denying the civilian population of their use.<sup>612</sup> The US also does not object to Protocol I (Article 54) which protects "drinking water installations." But all this does not extend to destruction of support installations that could result in the same secondary effects. Thus the destruction of dual-purpose power grids or communications, telephone and telecommunications, rail lines or roads are not restricted from attack. The US defended the right to attack integrated power grids as a legitimate target throughout the negotiation of the Geneva Protocols.<sup>613</sup>

#### **Attacking Installations with "Dangerous Forces"**

During the Gulf War, the allies hit two nuclear research reactors, chemical weapons facilities, and what it believed were biological weapons factories and storage sites. All of these facilities, as well as certain industrial chemical factories, could be interpreted as containing "dangerous forces," and thus the attacks on them might be restricted under the Geneva Protocols.<sup>614</sup> Absent the legal restraint, attacks on such installations probably runs against an international consensus to avoid such attacks, one that was strengthened after the experience of the 1986 Chernobyl accident.

But the US does not accept the prohibition of hitting installations with dangerous forces if they are also military targets. "Under some circumstances attacks on objects such as dams, dikes, and nuclear electrical generating stations may result in a distinct

and substantial military advantage...," the Air Force manual on international law states, "injury to civilians may be non-existent or at least not excessive in relation to the military advantage anticipated." Nevertheless, the Air Force recognizes "special concerns that destruction of such objects may unleash forces causing widespread havoc and injury far beyond any military advantage secured or anticipated." It recommends that the decision be made at the highest policy levels to strike such facilities.<sup>615</sup>

The US rejects Article 56 of the Geneva Protocols, which restricts attacks on nuclear electric generating stations.<sup>616</sup> The 1987 position of the Joint Chiefs of Staff was that it could not accept the "almost total prohibition on such attacks," as "the military perceives that in international conflicts, many situations may arise where it is important to attack and destroy parts of an electric power grid, such as a nuclear or hydroelectric generating station....Preserving the military option in international conflicts...is very important."<sup>617</sup>

Several resolutions have been passed by the International Atomic Energy Agency (IAEA) concerning just such attacks on civil nuclear facilities. Most important is Resolution 475 of the 31st IAEA General Conference which stated that there is a "need to prohibit armed attacks on nuclear installations from which such (radioactive) releases could occur." The Geneva-based Nuclear Non-Proliferation Treaty (NPT) Review Conference in September 1990 issued the collective statement that "this conference recognizes that an armed attack on a safeguarded nuclear facility, operational or under construction, or the threat of attack, would create a situation in which the Security Council would have to act immediately in accordance with the United Nations Charter." The US summarily rejected any such restrictions. When this issue was put to a vote in the UN General Assembly in December 1990, the US was the only country to cast a negative vote.<sup>618</sup>

The US is a party to the IAEA Convention on the Physical Protection of Nuclear Materials (ratified in 1981). Apart from considerations of common sense, it is the spirit and intent of the Convention not to attack civilian or military nuclear facilities. The preamble stresses "the importance of the physical protection of nuclear material in domestic use, storage and transport" and recognizes the "importance of effective physical

protection of nuclear material..." The Convention specifically applies to material in transport and "nuclear material used for peaceful purposes while in domestic storage."<sup>619</sup>

The attacks on Iraq's nuclear facilities and reactors, while seemingly a violation of both customary and conventional law, also raise questions about international non-proliferation policy and military necessity. The highly enriched uranium (HEU) that Iraq possesses falls under safeguarded inspections of the International Atomic Energy Agency (IAEA). The purpose of inspection is to certify that facilities are being used for peaceful purposes and are not being diverted for a nuclear weapons program. In late November, IAEA inspectors confirmed that the HEU was still in fuel rods.

In theory, under the Non-Proliferation Treaty (NPT), military and peaceful uses can be kept separate. The purpose of the NPT-mandated IAEA inspections is to guarantee that a peaceful nuclear facility is not used for military purposes. Yet despite the fact that Iraqi materials got a clean bill of health in November, the US decided to destroy the reactors anyway. The reactors are a prominent, but certainly not the most important, part of Iraq's nuclear weapons program. Attacking the reactors may have served a public relations goal by adding to the aura of a successful air campaign to knock out Saddam Hussein's nuclear capability, but it does not necessarily have any practical purpose in curtailing the Iraqi weapons research program, and may have done damage to the entire process and importance of IAEA inspections in the future.

The military attacks on nuclear facilities also did not relate to the objective of ejecting Iraqi forces from Kuwait, and cannot be shown to contribute to the restoration of "international peace and security" in the region. In fact, it is the provisions of the ceasefire, requiring Iraq to submit its nuclear, chemical and biological weapons assets and facilities to destruction, and not the bombing campaign, that will achieve the latter goal. The destruction of the facilities themselves, particularly the nuclear reactors, was superfluous to that objective.

### **Carpet Bombing and Indiscriminate Attacks**

The extensive use of the B-52 bomber during the air war has raised a number of



questions about the discriminate nature of allied attacks. As many as 50 B-52G bombers, flying out of bases in Diego Garcia, Spain, the United Kingdom, the United States, and Saudi Arabia, played a central role in the bombing campaigns.<sup>620</sup> These few bombers, representing less than one percent of the available aircraft force, and flying one percent of the combat sorties, dropped about 30 percent of the weapons, and 30 percent of the tonnage.<sup>621</sup>

B-52s dropped a variety of anti-personnel and anti-armor weapons, from "dumb" bombs, to cluster bombs, to fuel air explosives.<sup>622</sup> The bombers conducted high altitude, daylight "carpet bombing" raids, in which typically 40-60 500 or 750 lb. bombs were released in a simultaneous drop.

B-52 bombers were employed from the first night of attacks to the end of the war.<sup>623</sup> The Air Force stated that B-52 bombers were used on "area targets in the KTO, and on airfields, industrial targets, troop concentrations and storage areas in Iraq."<sup>624</sup> Early in the war, according to the Wall Street Journal, B-52s were "used to hit chemical and munitions storage sites" in Iraq.<sup>625</sup> The Washington Post reported that in the first week, B-52 bombers "assaulted Iraqi airfields, railroad tracks, and oil storage sites."<sup>626</sup> Aviation Week & Space Technology reported that the bombers were used against "ammunition or supply storage zones where a number of small revetments were located, or a grouping of buildings that were part of a strategic site such as a military production or tank repair facility."<sup>627</sup> B-52 bombers, according to Gen. Lee Butler, commander of the Strategic Air Command, also "helped track down and attack SCUD launchers."<sup>628</sup>

Bombardment of the Republican Guards in southern Iraq started on about 20 January, and B-52 bombers ultimately provided the bulk of the tonnage dropped in southern Iraq.<sup>629</sup> Gen. McPeak, in one of his first public appearances in the war, said that B-52 bombing runs were "distasteful," yet necessary. "The targets we are going after are widespread," he told Defense Week. "They are brigades and divisions and battalions on the battlefield. It's a rather low density target. So to spread bombs -- carpet bombing is not my favorite expression -- is proportionate to the target. Now is it a terrible thing? Yes. Does it kill people? Yes."<sup>630</sup>

The effect of B-52 attacks remains unclear. In military terms, the bombers,

according to Aviation Week & Space Technology, were "not particularly effective" against point targets such as "troops in the open or tanks dug in."<sup>631</sup> The New York Times reported at the end of the war that officers were "surprised by the resolve of Iraq's Republican Guard to remain in their dug-in position...", despite the extensive pounding by B-52 area bombing.<sup>632</sup> Since some of the B-52 bombing effort was directed at airfields and industrial installations, some collateral damage probably occurred to civilians, even though there are no reports that B-52s were used in and around Baghdad or other major cities.

Delivering 30 percent of the tonnage in the war, it is the psychological effect of the B-52 bomber's effort on dug-in troops that is stressed by military officers. The B-52 "has got a mystique about it," Maj. Gen. John L. Borling, deputy chief of operations at Strategic Air Command told the New York Times. "Because of its destructive power it has an ethos, a sense of awesomeness."<sup>633</sup> According to the Air Force, "Iraqi prisoners report [that] B-52 raids had devastating effects on enemy morale."<sup>634</sup> The bombing schedules were specifically revised to "make sure that they [the Republican Guards] never had more than a couple hours of sleep."<sup>635</sup> Even so, Aviation Week & Space Technology reported that "Intelligence officers said they not yet sure about the effectiveness of B-52 bombing as a psychological weapon."<sup>636</sup>

The war does exhibit a new custom being reinforced about "area" or "carpet" bombing in populated areas. B-52s with unguided gravity bombs do not appear to have been used against Baghdad, as they were used against the outlying areas of Haiphong and Hanoi in December 1972, or the way in which bombers were used in the Second World War and Korea. Article 51 of Geneva Protocol I prohibits any bombardment that treats a number of clearly separated and distinct military objectives located within a city as a single military objective. This is essentially a prohibition on "area bombing," and seems to have been tacitly accepted by the US. Perhaps this is because it may no longer be militarily useful or politically acceptable in an era of smart weapons.

### **Amiriya and the Bombing of Civilians**

In using civilians and prisoners of war to shield military targets from attack, Iraq

violated its obligations under the Geneva Conventions. However, such practice does not release the US from responsibility to apply the rule of "proportionality" in making attacks, an issue that was raised particularly with the bombing of the Amiriya shelter in Baghdad on 13 February.

According to an analysis by Middle East Watch, the US was aware that the Amiriya shelter previously had been harboring civilians. In this case, the shelter would be under protection of Article 65 of Geneva Protocol I, until an advance warning of the attack was given to Iraq. Article 65 provides that if civil defense shelters are transferred to military use, a warning is required before attack. The US has stated that it accepts as customary law those parts of the Protocols aimed at protection of civilians.<sup>637</sup>

At the same time it seems that the US could have given advance warning in this case. The Air Force manual for international law states that "Effective advance warning shall be given of attacks which may affect the civilian population unless circumstances do not permit."<sup>638</sup> Three weeks after the initial surprise attacks on Iraq, there was little justifiable reason why a general warning could not have been given to the population of Baghdad to stay away from potential military targets, particularly civil air raid shelters serving military functions.<sup>639</sup>

The allies also knew that Amiriya had been a civilian shelter in 1985, believing that it had been upgraded for military command and control.<sup>640</sup> On 13 February, Brig. Gen. Neal said, "We have no explanation at this time really why there were civilians in the bunker." Lt. Gen. Kelly said on 13 February that, "We didn't know that the Iraqis had civilians in there...Maybe they didn't go in and out until after dark last night and we didn't have a picture of it..." Neither Neal or Kelly attempted to justify the civilian deaths at Amiriya as "proportional" to the gain, but insisted instead that the US did not know civilians were present.

An intelligence failure is one explanation of a mistaken attack. Navy Capt. David Herrington, Director of Intelligence for the JCS said, "Over a period of time, military vehicles,... leadership vehicles...[and] a whole range of other equipment" were seen outside the shelter.<sup>641</sup> It seems odd that the US could describe military vehicles and limousines being present outside the shelter as justification for the attack, but yet could

not verify if civilians were present. According to CNN's Peter Arnett, the shelter was labelled "Department of Civilian Defense Public Shelter No. 25," one of many in Baghdad used routinely by civilians.

The second possible explanation for the attack, and the lack of advance warning, is that a short notice warning could have made the object of attack -- the believed occupants -- impossible. The Air Force international law manual specifically addresses such a case, concluding that "General warnings are more frequently given than specific warnings, lest the attacking force or the success of the mission be jeopardized."<sup>642</sup> It should be noted that civilian leadership are formally regarded as non-combatants, and might not be a legitimate object of attack alone under the laws of war. They would be subject to attack if co-located with military leadership.

The morning of 18 February 1991 before attacks on targets in the southern Iraqi cities of Basra, Faw, Zubair, Tannuma and Abul Khasib, allied bombers reportedly showered them with leaflets. They bore a picture of a missile and a warning in Arabic to local residents to leave the area in order to remain safe from bombings.<sup>643</sup> The US said after the Amiriya incident that it would look at new ways to protect civilians, including issuing warnings to local people. Subsequent to the Amiriya bombing, it is thought that leafleting was extensive in Baghdad.<sup>644</sup>

### **Retreat and Surrender**

According to US military sources, and confirmed by Iraqi Deputy Prime Minister Tariq Aziz, the majority of Iraqi military casualties actually occurred during the ground war, when the military began their retreat.<sup>645</sup> Due to disruption of lines of communications in the air war, Iraqi soldiers were seemingly unaware of a ceasefire, and certainly unaware of the provisions by which their lives would be saved if they abandoned their military equipment. Ten of thousands of soldiers were killed on the battlefield, as well as in full retreat at al-Mutlaa and the "highway to hell," and in the retreat across the Euphrates.

This is perhaps one of the most grisly aspects of the war itself, where anywhere from 25,000-50,000 soldiers died in a 100-hour period. Military conduct during a retreat,

particularly when airpower provides the ability to inflict a large number of casualties on unprotected soldiers, may be covered in the Hague Conventions IV on the Laws and Custom of War on Land, which consider the correct handling of "Armistices." Article 38 says that, "An armistice must be notified officially and in good time to the competent authorities and to the troops..." (emphasis added). The Convention does not address the relevant responsibility or technological capability to do this -- presumably it is for each side to inform their forces. But clearly in modern warfare the means of transmitting a ceasefire order can be destroyed, and the rapidity of movement on the battlefield threatens troops more than ever in the past.

The situation is less cloudy in the case of the post-ceasefire battle (massacre) of forces retreating over the Euphrates. This is because Iraqi forces reportedly opened fire first. The Geneva Protocol I, Article 41 states that retreating troops "clearly expresses an intention to surrender," and make no attempt to escape or engage in hostile acts.<sup>646</sup>

"Surrender" entails most simply the laying down of arms and the display of a white flag. It is assumed this choice is always available to combatants, and the norm is believed to be universally accepted. Some Iraqi forces, though, choose to flee north at the end of the ground war, and did not display the standard requirements for surrender. The forces were regarded as "retreating" and were therefore, under the existing laws of war, legitimate targets. One tragic element of this behavior may be that Iraqi forces chose not to surrender because they expected to be maltreated or killed -- as had been the widespread practice during the Iran-Iraq war. This is a reminder that the laws of war are perhaps not as universal as is implied by their existence.

### **New Challenges with the Remnants of War**

An intense war, where hundreds of thousands of weapons were fired from the ground and the air, where tens of thousands of bombs dispersed tens of millions of sub-munitions, where hundreds of thousands of mines were emplaced, also leaves behind an explosive detritus. The question of the "remnants of war," in many ways, according to military sources, is worsening, as the use of smaller and smaller lethal munitions increases. The Gulf war seems to verify that trend, and the clearing of live ammunition,

mines, bombs and shells, as well as wrecks and other obstacles and remnants of the war, is proving, and will prove, a major burden.

The issue of dealing with the remnant of war has arisen at a number of international legal and humanitarian gatherings, and is addressed in several UN resolutions concerning the responsibility of combatants to take remedial action. The United States previously has not fulfilled its own responsibilities regarding remnants of war in Indochina. Thousands of people a year are still being injured by mines from various nations left in Cambodia. Similarly, hundreds of Afghans are being injured annually as a result of the widespread indiscriminate mining from aircraft and helicopters that the Soviet Union conducted during its occupation. Shrapnel from the Vietnam War still constitutes an economically destructive hazard to livestock and crop growing in the paddy fields of Vietnam.<sup>647</sup>

Press reports suggest that some 500,000 land mines were emplaced by Iraq inside the southern and western border of Kuwait. The Inhumane Weapons Convention prohibits the use of mines in an indiscriminate manner, and requires the recording of location of mines, as well as the installation of a mechanism to automatically neutralize them. The Convention also calls for international cooperation in a process to remove mines. A major concern in the ceasefire with Iraq was cooperation in locating and clearing minefields in Kuwait, since Iraq is not a party to the Convention. Iraq has conformed with the ceasefire requirements relating to mines. On 4 March, it provided information on the location of land and sea mines. On 8 March, after two weeks of non-stop minesweeping operations, the port of Kuwait City was safe enough to reopen. A channel to the port of Ash Shuaybah was opened on 12 March. The process of removing emplaced mines from Kuwaiti beaches and the Kuwaiti-Saudi border continues. (The mine problem is long-term, and not easily solvable. There were numerous reports of Iraqi refugees being killed by mines from the Iran-Iraq war when they crossed the Iran-Iraq border while fleeing during the civil war).

A large Army and Marine Corps effort has also been spent destroying the "endless caches of weapons and ammunition left behind by the retreating Iraqi Army."<sup>648</sup> Allied forces have been destroying captured war materiel -- tanks, armored personnel carriers,

cargo trucks, antiaircraft guns, artillery, fuel tanks, and ordnance -- by the thousands of items. Demolition crews and engineers have scoured fortifications and bunkers, where they have also found numerous booby traps.

It is when it comes to unexploded ordnance that there is the biggest, and most persistent, problem. US military officials estimate that three to five percent of their artillery projectiles and bombs failed to explode, although soft sand may have increased the dud rate to up to 15 percent in some areas. One US expert said that "at least 600 bombs, rockets and artillery shells dropped or fired every day of the war will have failed to explode and thus constitute a continuing hazard somewhere in the war theater."<sup>649</sup> The hazard of the remnants of war was felt even during the ground war, where unexploded ordnance threatened US and allied forces. Troops with the 1st Armored Division said that the principle threat they faced was "unexploded ordnance believed to have been left over from an earlier American bombardment."<sup>650</sup> As the Washington Post observed on 3 March, "units of the Army's 1st Cavalry Division that had suffered no combat casualties in their unopposed drive through southern Iraq have seen several of their soldiers killed or wounded by bombs or mines in the area they are holding."<sup>651</sup>

Common are the yellow baseball-sized individual sub-munitions (bomblets) from cluster bombs and munitions, and dual-purpose improved conventional munitions (DPICM)-type artillery projectiles.<sup>652</sup> Adding to the complication of recovering modern ordnance, one expert stated, is the "increasing variety and sophistication of ordnance technology, from the plastic land mine to the bomblet-scattering runway clearers used on Iraqi airstrips to 'toe poppers' designed to look like bits of camel dung."<sup>653</sup> There have been reports of Iraqi children being killed while playing with or stepping on unexploded bomblets from allied cluster bombs.<sup>654</sup>

According to the Washington Post, allied officers estimated that by the end of March they had already disposed of some 600,000 pieces of ordnance in and around Kuwait City. French military forces, which are clearing the beaches of mines, had found about 6,000. Although the clearing effort is expected to last at least into June, in the words of one French engineer, "For the next 10 years, Kuwait people will have to look for what's on the beaches..."<sup>655</sup> Sea mines off the Kuwaiti coast are believed to

number more than 1,000, and the task to clear and northern gulf is expected to take months, "perhaps even years."<sup>656</sup>

Unexploded ordnance has already caused a number of casualties among disposal specialists, and with weapons spread across the desert, the problem is sure to persist for some time. "There's so much stuff around here that if it's not directly interfering with operations, we're just going to leave it," one explosive ordnance disposal expert told the Los Angeles Times. "Hell, this is Iraq."<sup>657</sup>

### **Iraqi Conduct and International Law**

Soon after the Iraqi invasion of Kuwait, widespread arrests of civilians began, and there were extensive press reports of Kuwaiti civilians being tortured and executed, men being beaten during interrogations, women being raped, babies being removed from hospital incubators, as well as widespread looting of Kuwaiti homes, businesses, warehouses, and industrial sites.<sup>658</sup>

Early on in the Iraqi occupation, Saddam Hussein threatened to destroy the oil infrastructure of the country as well as to turn Kuwait into a "graveyard" if Iraq came under attack. From late December, when Iraqi engineers first experimented with blowing up wells at al Ahmadi; to the last weeks of February, when Iraq methodically undertook to obliterate Kuwait's electricity, water, and oil producing capacity, these threats were carried out.

From August to November, Amnesty International estimated that there were about 10,000 Kuwaiti detainees. The number of detained military personnel during this time was estimated at 6,000-7,000, the majority of whom were reported to have been transferred to Iraq.<sup>659</sup> The exact number who were tortured still cannot be estimated. A number of people interviewed by Amnesty International stated that detainees who had been badly mutilated as a result of torture, were either kept in detention, prevented from leaving Kuwait, or executed.<sup>660</sup> At the beginning of the air war, the Washington Post reported as many as 2,000 additional Kuwaitis were taken from their homes and transported to Basra.<sup>661</sup>

The Iraqi invasion and occupation of Kuwait, as well as its conduct during the war



and during its retreat, was thus a seven month episode of human terror and vindictive destruction, much of it in direct violation of virtually all standards of international law. "There can be no doubt that a deliberate attempt was made to extinguish Kuwait, its national identity, the pride of its people in their history and achievements. The manner of destruction, with its coordinated vandalism and massive looting leaves an indelible image," Martti Ahtisaari, UN Under-Secretary said after visiting the country at the end of the war.<sup>662</sup>

Iraq violated many tenets of customary international law of human rights, such as the 1948 UN Universal Declaration of Human Rights, the 1961 Vienna Convention on Diplomatic Relations, the 1976 International Covenant on Civil and Political Rights, and the 1984 Convention Against Torture and other Cruel, Inhumane or Degrading Treatment or Punishment.<sup>663</sup> Iraq also violated at least 17 key articles of the 1949 Geneva Convention Relative to the Protection of Civilian Persons in Time of War (the fourth Convention). These include virtually every act defined as a "grave breach" of the Convention, and therefore constitutes a war crime, as defined in Articles 147-148.

#### **Iraqi Conduct During the War**

Throughout the war itself, there were numerous reports of Iraqi military forces mistreating allied prisoners of war, faking bomb damage, and seeking sanctuary in civilian facilities, all direct violations of the laws of armed conflict.<sup>664</sup> There was also a highly controversial episode of Iraqi treachery in late January, when armored forces "surrendered" during the battle of al Khafji, and then turned their guns on allied soldiers caught off guard.<sup>665</sup>

On 28 January, Iraqi radio reported that allied airmen were being disbursed to industrial sites where they would serve as shields against further attacks. The next day, Iraqi radio reported that an allied POW held at the Ministry of Industry had been killed in such an air attack.<sup>666</sup> Gen. Schwarzkopf responded on 30 January that Iraq had committed "a gross violation of the Geneva Convention," and challenged Iraq to allow the ICRC to inspect allied POW camps.<sup>667</sup>

Iraq's seeming indifference to the deployment of air defense artillery guns, and other military equipment, in civilian areas, was consistently criticized by the US

government, and its allies. The Iraqi military reportedly installed anti-aircraft artillery guns on the grounds and roofs of schools and hospitals in Kuwait City and elsewhere.<sup>668</sup> On 20 January, Gen. Schwarzkopf stated that "We now have reports that many of their smaller aircraft, they have moved to roads and hidden them in residential areas that are close to airfields, because they know we're not attacking civilian targets."<sup>669</sup> Gen. Schwarzkopf reiterated on 13 February, after the Amiriya bombing that Iraq had relocated military targets in or near civilian structures, but still foreswore allied attack:

Right now they've dispersed their airplanes into residential areas, they've moved their headquarters into hotel buildings, they've put guns and things like that on top of high-rise apartment buildings. Under the Geneva Conventions, that gives us a perfect right to go after those things if we want to do them. We haven't done it.<sup>670</sup>

On the day after the Amiriya bunker bombing, Sec. Cheney stated that "We do know that he is placing military equipment in civilian areas, especially in Kuwait, but also in Iraq." He cited the placing of two MiG-21 fighter aircraft next to an ancient pyramid near the city of Ur.<sup>671</sup> One Navy Admiral stated that Iraq was moving tanks and other vehicles near civilian buildings in Kuwait, "hoping the tactic would spare them from allied bombing."<sup>672</sup> On 19 February, the Defense Department accused Iraq of faking bomb damage at the al Basrah Mosque to make it appear that US bombs had damaged a religious site when they bombed Basra on 7-8 February.

On 30 January, in response to questions about reported air attacks on civilian vehicles on the Baghdad-Jordan highway, Brig. Gen. Glosson stated that, "the Iraqi government insists on storing SCUDs in culverts and other things along the highway....when we see those types of vehicles go into those facilities, we bomb them. We made every attempt to minimize any possibility of civilian casualties...."<sup>673</sup> Gen. Schwarzkopf added, "We have never said there won't be any civilian casualties. What we have said is the difference between us and the Iraqis is we are not deliberately targeting civilians -- that's the difference. There are going to be casualties -- unfortunately, that's what happens when you have a war. But we are certainly not deliberately targeting

civilians, we never have, and we have no intention of doing it in the future. Our enemy certainly is, and I hope that's obvious to everybody in this room since you've been under SCUD attack."<sup>674</sup>

### **Questioning Iraqi "Atrocities"**

Some of the accounts of torture and killing, particularly those received through the Kuwaiti "resistance" remaining in the country during the occupation, seem to be exaggerated. Also allied air and artillery attacks clearly accounted for some of the damage to Kuwait. There have been persistent reports that as much as 20-30 percent of the oil spilled in the Gulf may have resulted from coalition air attacks on oil storage facilities and refineries, as well as by the US sinking of an Iraqi tanker in the Gulf.<sup>675</sup> On 12 February, speaking about the oil fires, Rear Adm. Mike McConnell stated that "there also the possibility that some of our strikes may have had some collateral damage to start a fire."<sup>676</sup> Nonetheless, it is possible to catalog a series of Iraqi acts that violated the humanitarian provisions of the Hague and Geneva conventions, and caused excessive and grave destruction.

As the ground war neared, reports started to come out of Kuwait of renewed killing and atrocities. On 24 February, President Bush's Deputy National Security Adviser Robert Gates said in a CNN interview that there were "large scale executions and torture, mutilation" being committed in Kuwait, "...we are hearing that they may be setting fire to Kuwait City itself, large sections of the city are in flames. This is a sort of a medieval practice."<sup>677</sup>

Gates' statement, and other reports preceding the ground war, indicated a level of violence that many eyewitnesses, particularly journalists who entered Kuwait after the ceasefire, could not confirm. According to one report in early March, "The extent of the violence is still unknown. Some Kuwaitis said that allied forces had exaggerated atrocities in order to demonize the Iraqi armed forces."<sup>678</sup>

Whether this is true or not, it seems that the Iraqi secret police, and not the military, was responsible for much of the personal violence. "Kuwaitis said that many of the executions and beatings were carried out under the orders of secret police with the

Iraqi military."<sup>679</sup> The Secret Police "conducted a continual, vicious campaign to root out resistance fighters." Many of the eyewitness reports of deaths were of people active in the armed resistance.<sup>680</sup>

### **Oil Spill, Fires and International Law**

On 25 January, the day the military revealed the extent of oil spilling into the Persian Gulf, President Bush said that, "Saddam Hussein continues to amaze the world...And now he resorts to enormous environmental damage...I mean, he is clearly outraging the world."<sup>681</sup> On February 13, a White House statement further condemned Saddam Hussein's "environmental terrorism," pointing out that the oil spills were spreading "throughout the Gulf killing wildlife and threatening human water supplies."<sup>682</sup>

Certainly the customary rule against "wanton destruction" would seem to apply to this act of environmental destruction. John Norton Moore, professor of international law at the University of Virginia, and chair of the American Bar Association Section of National Security Law, said the "oil field atrocity is clearly a grave breach of the fourth Geneva Convention," against "wanton" destruction of property. "This is the first example the world has seen of nationcide. It is not only genocide against a people but directed to end a nation."<sup>683</sup>

In this case, there seems to be a consensus that Iraq's action constitutes "wanton destruction," although the Geneva Conventions are still thought an inadequate instrument, given their allowance for such acts if a military necessity can be demonstrated.<sup>684</sup> Article 35 of Geneva Protocol I ("It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment") could apply to the oil spills and fires as customary law. The political underpinnings are weakened by the fact that neither the US nor Iraq are parties.

The Environmental Modification Convention (ENMOD) is the only relevant treaty that relates directly to using natural forces as weapons. However, environmental modification techniques are not defined in the treaty. Destroying oil wells or deliberate

oil spills were not necessarily what the drafters had in mind, ENMOD being more concerned with as yet unknown methods of affecting weather patterns, provoking tornadoes or tsunamies, or altering the ozone layer. Nevertheless, both the fires and the spills could be regarded as an environmental modification technique. Under ENMOD, only one of three criteria -- "long term," "widespread," or "severe" -- must be met for the convention to apply. Severe is defined as that "involving serious or significant disruption or harm to human life, natural or economic resources, or other assets."

Kuwait is a party to ENMOD, and Iraq is not. Unfortunately, the Convention is one of the least popular in the law of armed conflict. Nevertheless, ENMOD would have relevance as customary law, in any imagined war crimes case, as would other emerging international legal principles relating to state responsibility for transboundary pollution.<sup>685</sup>

It is unclear whether oil wells constitute installations containing "dangerous forces." The examples given in Protocol I, such as nuclear electrical generating stations, are not meant to be exhaustive, and a liberal construction could say that the release of the force of the oil fires and spills are covered. However, these provisions are subject to interpretations of military necessity. Under Article 55, Paragraph 1, an occupying power such as Iraq may carry out destruction of installations containing dangerous forces if the act "required by imperative military necessity."<sup>686</sup>

#### **Military Necessity and the Oil Fires**

Under the provisions of international law, Iraq could attempt to defend the destruction of Kuwait's oil wells as "rendered absolutely necessary by military operations." Total allied air supremacy, the intensity of the air war, and Iraq's poor military showing, would tend to bolster a case that the oil fires were able to hamper allied air operations, and therefore were within the requirements of the laws of war.

On 22 January, when the Defense Department first detected smoke from sabotaged oil facilities in Kuwait, Lt. Gen. Kelly stated that smoke was having "no effect on US military operations." Later that same day, military spokesman Lt. Col. Greg Pepin in Riyadh stated that "Obviously if there's heavy smoke, that's going to affect operations somewhat."<sup>687</sup> Within a week, however, the US had arrived at its "official"

position on the issue, likely with an eye towards accusing Iraq of war crimes. "They tried to use it as a strategic weapon," Pentagon spokesman Pete Williams charged on 28 January. But, because the oil spill is "not necessarily interfering with any military operations, it's a serious act of environmental terrorism."<sup>688</sup> Nevertheless, on the same day, Saddam Hussein told CNN that "If the Iraqis were to use oil for self-defense, including the use of oil in waters, then the Iraqis shall be justified for taking such an action."

Throughout the war, contrary to the official US position, there were numerous authoritative reports of instances where pilots talked about smoke impeding their vision and targeting, as well as reports of ground commanders having to use flashlights to read maps during the day because of the smoke.<sup>689</sup> The Navy reported on 13 February, the "air campaign in Kuwait is complicated by smoke from over 50 oil field fires, mainly in al-Wafra area."<sup>690</sup>

A naval spokesman in the Gulf said aboard the USS Midway on 23 February that, "Some of the targets we have gone to as far as preparing the battlefield we have not been able to hit due to the blockage by the smoke."<sup>691</sup> Other pilots reported that smoke hampered bombing -- "The black smoke up there from the fires was unbelievable," an F-15 pilot told the AP.<sup>692</sup> Oil fires and smoke were used to mask specific Iraqi military actions. According to the Washington Post, "Marines encountered one of the fiercest fire fights of the campaign as Iraqi troops hiding in the oil fields launched a surprise counterattack through the haze of smoke and fire."<sup>693</sup>

One pool reporter with Marine units described the battlefield scene on 26 February: "Monday night it was literally impossible to see one foot in front of you and the marine units had to stop in place and organize hasty defensive perimeters. It was as if a thick black veil had been drawn totally across the sky and then foul smelling clouds of thick black gas pumped into the region to complete the blackout (sic)."<sup>694</sup>

Visibility was further complicated by "smoke from trenches filled with oil set afire by bombing raids" on the part of allied aircraft.<sup>695</sup> The line of burning oil, according to one pool report, "stretched all along the Saudi-Kuwaiti border. Flames spewed 100 feet high and so much black smoke poured forth that it virtually blotted out the sky."<sup>696</sup>

Iraqi military units also ignited numerous smudge pots some 24 hours before the ground offensive began to create smoke for tactical purposes.<sup>697</sup>

At the end of the war, numerous agencies of the US government, led by the Defense Nuclear Agency (DNA), initiated a project to evaluate the effect of the smoke on military operations, as well as to take advantage of the opportunity of the large amounts of smoke to draw lessons for nuclear warfare and its effects. In a 4 March briefing, "Battlefield and Theater Smoke Cloud Experiments," the DNA stated that "Smoke was a factor in many operations. In a prolonged campaign, the detriment could have been significant."<sup>698</sup> Whether or not Iraq could mount any credible defense, the very defense is possible because of a lack of unconditional prohibitions in the laws of war.

### **Iraqi Use of Napalm and Gas**

With the beginning of the civil war on 6 March, so came a number of new reports of Iraqi use of napalm and chemicals against the opposition. A videotape aired on British ITN reportedly shot by Iraqi rebels showed what was described as victims of gas attacks in mid-March.<sup>699</sup> Iranian radio and Shiite spokesmen said that as many as 16,000 people had been killed near Karbala and Najaf, when government troops used napalm and "suffocating gas."<sup>700</sup> Iranian sources also said that napalm was being used in Basra "on a wide scale."<sup>701</sup> Refugees claimed that phosphorus bombs "were being used against the opposition, women and children included."<sup>702</sup> Children with injuries from a "napalm bomb" explosion were observed at Iranian refugee camps.<sup>703</sup> And refugees claimed symptoms that reportedly matched the effects of mustard gas.<sup>704</sup> Reports that the helicopters gunships were using sulfuric acid and napalm against insurgents were confirmed by relief organizations working on the borders. Doctors Without Borders working in Sulaimaniya before it was retaken by government forces reported that they saw many victims of napalm and phosphorous and that "the majority of the wounded were civilian."<sup>705</sup>

The US warned Iraq on 9 March not to use chemical weapons against the insurgents, although it was clear that no military action would be undertaken to force Iraq. In mid-March, however, the US government said that it was unable to confirm

reports that Iraq had in fact used chemical weapons or napalm, an opinion that was repeated at the end of the month.<sup>706</sup>

### **Iraqi Reparations and the Enforcement of War Crimes**

UN Security Council Resolution 674 of 29 October 1990 reminded Iraq that it was responsible under international law for loss, damage, injury as result of its illegal invasion and occupation of Kuwait. Resolution 686 of 2 March 1991 demanded that Iraq "accept in principle its liability under international law for any loss, damage, or injury arising in regard to Kuwait and third states, and their nationals and corporations, as a result of the invasion and illegal occupation of Kuwait by Iraq." Iraq acceded to the resolution. Also, Resolution 687 said that Iraq was liable for environmental damage under international law as a result of the "unlawful invasion of Kuwait." Kuwait's claims for reparations are based on the physical destruction caused by Iraq, as well as on the treatment of civilians by an illegally occupying force.<sup>707</sup>

Relevant laws include the prohibition on destroying real property in occupied territory under the Geneva Convention IV (Article 53). There is also a rule of liability to pay compensation for violation of any rule of armed conflict established under the Hague Convention IV (Article 3) and under Geneva Protocol I (Article 91). Destruction of property and man-made objects including oil wells and facilities thus will be the subject of reparations, in part because the damage can be quantified monetarily. Damage to the natural environment in Kuwait, and in the region, will be handled by the traditional war reparations standards, and not by the standards of international environmental law.

Iraq's punishment under war reparations, rather than war crimes trials for Saddam Hussein or other leaders in absentia, will not resolve nagging questions of the authority and function of an international criminal court. Since the Second World War, there have been no official cases of war crimes charges, nor detailed official examinations of conduct during warfare or bombardment, nor the use of tribunals or courts to settle disputes of damage arising as a result of warfare between nations. The most comprehensive war crimes trials of individuals remain the International Military Tribunals at Nuremburg, and the Far East Tribunals in Tokyo.<sup>708</sup>



There are several well known cases of monetary settlements between countries for errors of war: the Israeli attack on the USS Liberty in the 1967 war, and the Iraqi attack on the USS Stark in the Gulf in 1987. But the active enforcement of the law between governments or former combatants like Iraq and Iran, or the US and Vietnam have been largely absent, confined to accusations rather than adjudication. A recent attempt to bring a military charge to trial was that by Nicaragua against the US in 1984. Nicaragua brought a case before the International Court of Justice at the Hague charging illegal mining of its harbors. The US promptly withdrew its state consent to come under the jurisdiction of the court for a period of several years.<sup>709</sup>

## Conclusion

The Gulf War included open and aggressive efforts on the part of US and allied governments to justify their actions on the basis of international "law," as well as a constant public relations program to promote military conduct as being in accordance with contemporary societal, moral, and legal standards. From the very beginning of August, allied governments felt it necessary to develop a public and international consensus to justify military action. During the war itself, US and allied spokesmen were anxious to maintain that their actions were in compliance with the laws of war, and that the allies did everything necessary to avoid civilian casualties.<sup>710</sup>

When controversy arose over civilian deaths, government and military spokesmen repudiated any such intentions in their attacks, and pledged to reevaluate planned operations to avoid such mistakes in the future.<sup>711</sup> The deaths of civilians, particularly in the Amiriya shelter bombing, had a strong effect on the military, as they had specifically avoided area bombing (indiscriminate attacks) in populated areas. Mindful of public opinion, the US and its coalition partners chose to refrain from using fire bombs (napalm), fuel air explosives, or concussion bombs ("daisy cutters") against civilian areas, or against troops in the open, confining their use to the clearance of minefields and the destruction of bunkers.<sup>712</sup> Some could even argue that the allies made a real effort to get their unfortunate calling over as quickly as possible.

Much of this behavior could be seen as paving the way for positive new standards for humanitarian and military conduct. Through the repudiation of civilian attacks, albeit perhaps only in the context of an otherwise highly successful war, the US and its allies tacitly behaved in accordance with provisions of the Geneva Protocols, and may have also accepted certain de facto constraints, such as those of the Inhumane Weapons Convention.

Iraq's gross behavior, particularly its devastation of the natural environment, serves as a sad contrast. But its action may serve to create new absolute prohibitions on environmental damage, and through that a new series of protections for the population's support systems. This would make the conduct of war that much more difficult in the

future.

The Gulf War, following the introduction of the Vietnam experience, firmly roots in society's mind a new reality that environmental destruction is a given result of modern war. Such destruction may have been previously thought of as incidental to the conduct of war, but Iraq's intentional actions to release oil into the Gulf, and its later destruction of the oil wells, elevates environmental damage to a more core tool of military action, reprisal, or revenge.

Iraq's destruction clearly runs up against the public's new environmental consciousness, as well as a societal norm against deliberately damaging natural resources. Despite the often lamented inadequacy of the law, and the seeming reluctance of the Bush Administration to take action to have Iraq's environmental acts codified as "war crimes," an inevitable conclusion is that this type of environmental damage is unacceptable, no matter what the seeming military necessity. "This is an international environmental disaster and not simply a problem for Kuwait," former US Ambassador to the UN Donald McHenry stated after a tour of the oil fields. "I am much more inclined now to say Saddam Hussein has to be tried than I was before because of the scope of his destruction. Because of the vindictiveness of it all."<sup>713</sup>

While Iraq's intentional violations of the laws and norms of international behavior, humanitarian and military, are clear, assessing allied conduct is more difficult. This is because the traditional and conventional laws of war -- which center on the assumption of humanitarian conduct without restraining war itself -- are an incomplete guide to moral behavior in the modern world. As the US Navy's own manual on international war says, "The law of war is not meant to impede the waging of hostilities."<sup>714</sup> A conventional view of allied conduct must conclude that allied military forces were within the letter of most of the laws of war as they currently stand.

Allied conduct is the wrong focus of attention in terms of understanding the Gulf War. It is allied capability that is the more challenging subject. The force and decisiveness of the application of modern weapons, and the heretofore unexperienced power of an efficient electronic armed force working in synergy astonished Iraq, the public, and the allied military itself. Whether it was in the overestimation of Iraq's

military capability, and its desultory defenses, or in the rigidity of the allied plan, and its Second World War model of strategic bombardment, the allies misunderstood the force of the application of their own weaponry. Such an understanding is necessary before any call for more law is made.

This was a lopsided victory hardly or rarely seen before in human combat.

Jonathan Schell wrote,

this is not 'war' in any previously known sense of the word. It is slaughter. The fault does not lie with the American military --- every army tries to inflict as many casualties as possible on the enemy while minimizing its own. But the result is that the Iraqis' land (and the land of Kuwait, which they unjustly seized) has become their cage. We stand outside its bars and torment and kill them at will, waiting for the tyrant who dominates them to do our bidding. Irrespective of the justice of the cause, the human spirit is chilled to witness such unequal combat, if you can call it combat at all.<sup>715</sup>

Given the availability of precision guided weapons, and the strength of the international embargo, the validity and necessity of "strategic bombing" -- striking a large-scale generic set of military, "economic," and national targets "rear" of the battlefield -- is called into question. The embargo achieved more "strategic" purpose than the bombing, as it denied Iraq resources, spare parts, and replenishment. Iraq was not defeated because its warmaking "industrial base" or electricity production capacity was put out of service.

The effect of old-fashioned strategic bombardment during this new modern "hyper war" was life threatening disruption of the human environment, and a grisly aftermath for the Iraqi people. Smart bombs were far more deadly than dumb bombs, and even the accuracy of modern dumb bombs was significantly greater than ever before. The impact was efficient destruction of civil installations such as electrical generating, oil supply, roads and bridges, and of industrial research and production, all having a profound effect on the population's ability to sustain modern life. The targeting of these life support functions of the civilian population, even for military effect, disabled the very objects that are otherwise restricted from attack: medical care, safe water supplies, food. In modern

society, the support systems of these objects are inseparable from those that also feed the military establishment.

The instant media coverage of this war may serve to significantly raise public expectations as to the conduct of war in the future. There is no denying that the public, and public opinion, became a third force in the conflict. Through the shared consent of the conduct of the war, the public imposed certain expectations as to proper and acceptable behavior. In many ways, what was widely accepted as "wrong" -- the oil spills and oil fires, or the ambiguous state of the Kurdish people and the allied belated protection of them -- did not necessarily relate to the current state of the laws of war. This sentiment was perhaps best expressed by columnist Richard Cohen, who asked a typical question which the law cannot answer:

Having encouraged dissident Iraqi groups to rebel against Saddam Hussein, it [the Bush Administration] now sits back and declares its studied neutrality. From the White House come conflicting statements about Iraqi use of helicopters and fixed-wing aircraft. The former is permitted, the latter is not. The murder of civilians by artillery and conventional weapons is permitted but not their death by poison gas -- as if to die in conformance with the Geneva Convention changes matters any.<sup>716</sup>

The Gulf War came and went too quickly for most of us to adjust to the new reality. No one can honestly say that they expected such a lopsided outcome. From the very first night of the war, US and allied military planners were perplexed as to lack of aggressive military action on the part of the Iraqis. It is still unclear why Iraq lost so badly.

What this "hyper war" demonstrated is that the idea of a war in which non-combatants are safeguarded is no longer credible. One can go through all of the rules of engagement, the limitations on collateral damage, the strict behavior in accordance with the standard laws of armed conflict and international law, but still arrive at the conclusion that destruction of a modern army requires destroying modern society.

If this war is to be the model for the level of effort that "hyper war" demands in the future, if this is the intensity to be expected, if this is the duration, then it is the

unintentional effects of war that now needs to move more to the center of our concerns. Some leaders in the US military have already expressed remorse about the level of destruction that was caused. And while this destruction might be explained by others as "justified" in light of the justness of the conflict, that approach leaves the wrong impression as to the extent of the damage, or the way in which it was inflicted.

An old fashioned definition of collateral damage is that shrapnel has to scar civilians, or rubble has to fall on them. The new definition is that water, electricity, and fuel are taken away from civil society. People who live in cities, in modern societies, are dependent for their lives, not just their comfort, on such support systems. Thus their destruction is as much de facto terror bombing, as destruction of oil wells is environmental terrorism.

The Gulf War showed us that the battlefield has very tentative boundaries. Even in the desert, in the "perfect" battlefield, with hundreds of square miles of uninhabited territory, the killing zone ended up being Kuwaiti and Iraqi society, as an unexplainable pall spread rapidly out of control.



## Endnotes

1. World Commission on Environment and Development, Our Common Future (New York: Oxford University Press, 1987), p. 22.
2. The Council on Environmental Quality and the Department of State, The Global 2000 Report to the President, "Entering the Twenty-First Century, The Technical Report," Volume Two, p. 227.
3. Douglas duCharme, Mennonite Central Committee Report, 22 April 1991, p. 6.
4. A conservative estimate of war dead in the Iran-Iraq war is 367,000: 262,000 Iranians, and 105,000 Iraqis. See Dilip Hiro, The Longest War: The Iran-Iraq Military Conflict (New York: Routledge Chapman & Hall, Inc., 1991), p. 250.
5. "A Textbook Victory," Newsweek, 11 March 1991, p. 22.
6. James W. Canan, "Airpower Opens the Fight," Air Force Magazine, March 1991, p. 16.
7. Remarks by the Honorable Donald B. Rice, Secretary of the Air Force, to the Atlantic CEO Institute 1991 Roundtable, Washington, DC, 16 March 1991.
8. Lt. Gen. Horner, quoted in Douglas Jehl, "War Analysts Delving Into What Went Wrong," Los Angeles Times, 24 March 1991, p. 1. See also Eric Schmitt with Michael R. Gordon, "Unforeseen Problems in Air War Forced Allies to Improvise Tactics," New York Times, 10 March 1991, p. A1. Gen. McPeak also stated on 15 March that the air campaign called for in the war plan was to have lasted 30 days; DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
9. CENTCOM Briefing, Maj. Gen. Robert B. Johnston, USMC, Riyadh, Saudi Arabia, Friday, 8 February 1991.
10. President Bush approved the general design of the war plan, as well as the key dates for initiation of the air war, the ground war, and the ceasefire. But he did not involve himself in the specifics of the targeting effort. "I don't think you would ever see George Bush going over targeting charts. He's not involved in that kind of micro-management," White House spokesman Marlin Fitzwater said in January; Melissa Healy and Mark Fineman, "U.S. Forced to Defend Basic Targeting Goals," Los Angeles Times, 14 February 1991, p. 1.
11. Maureen Dowd, "Bush at War: Seeking to Be Not Too Detached, Yet Not Gripped by Detail," New York Times, 23 January 1991, p. A8.
12. During the Vietnam War, for instance, aircraft scored a hit rate of about 30 percent, firing mostly unguided munitions; Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51. See also John D. Morrocco, "War Will Reshape Doctrine, But Lessons Are Limited," Aviation Week & Space Technology, 22 April 1991, p. 42.
13. See, e.g., William Boot, "The Pool," Columbia Journalism Review, May/June 1991, p. 24; Chris Hedges, "The Unilaterals," Columbia Journalism Review, May/June 1991, p. 27.
14. John H. Cushman Jr., "Military Experts See a Death Toll of 25,000 to 50,000 Iraqi Troops," New York Times, 1 March 1991, p. 1.
15. R. Jeffrey Smith, "U.S. Has, but Won't Release, Tally of Buried Iraqi Soldiers," Washington Post, 26 March 1991, p. A11.
16. "Saddam has a real problem," USA Today, 25 March 1991, p. 7.
17. Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A1.
18. UPI (Thomas Ferraro, Kuwait City), "Dead birds may signal danger for man," 6 April 1991.
19. "Saudis prepare to clear oil from troubled waters," New Scientist, 23 March 1991, p. 20.
20. Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A14.
21. Soraya S. Nelson, "Smoke from burning wells poses health risk," Navy Times, 1 April 1991, p. 10.
22. Matthew L. Wald, "Kuwaitis, Having Survived Hussein, Now Find Their Environment Toxic," New York Times, 28 April 1991.
23. R. Jeffrey Smith, "U.S. Has, but Won't Release, Tally of Buried Iraqi Soldiers," Washington Post, 26 March 1991, p. A11.
24. Articles 15 and 16 of the 1949 Geneva Conventions stipulate that combatants are obligated to record "particulars which may assist in...identification" of enemy war dead and provide this information as quickly as possible in "duly authenticated lists" to the opponents through the Red Cross. Article 16 requires that bodies be buried individually in marked graves, and only after careful examination to establish identity and cause of death; Holly Burkhalter, "Some Bodies Don't Count," Los Angeles Times, 12 March 1991, p. B5.
25. Matthew L. Wald, "Kuwaitis, Having Survived Hussein, Now Find Their Environment Toxic," New York Times, 28 April 1991.
26. Michael Parrish, "Environment Becomes Burning Issue in Kuwait," Los Angeles Times, 4 May 1991.
27. See, e.g., Clyde Haberman, "Kuwaitis Plan Big Restoration Effort," New York Times, 27 February 1991; Stuart Auerbach, "Contracts Awarded For Kuwait Cleanup," Washington Post, 5 March 1991, p. D1; Tom Diaz, "Basic needs still unmet in Kuwait," Washington Times, 18 March 1991. Youssef M. Ibrahim, "In Kuwait, Ramadan Has a Bitter Taste," New York Times, 19 March 1991, p. A1; John Kifner, "Power Struggle in Kuwait Blocks New Government," New York Times, 31 March 1991, p. 1.
28. Letter, John Belluardo, Public Information Officer, San Francisco Operations Office, Department of Energy, to Rob Kalb, Public Affairs Office, Lawrence Livermore National Laboratory, Livermore, CA; 25 January 1991; see also John Horgan, "U.S. Gags Discussion of War's Environmental Effects," Scientific American, May 1991, p. 24.
29. Representative Nancy Pelosi, "Environmental Consequences of the Gulf War," Congressional Record, 16 April 1991.
30. Frank J. Murray, "Bush scrupulously avoids making military decisions," Washington Times, 23 January 1991, p. B1; see also Maureen Dowd, "Bush at War: Seeking to Be Not Too Detached, Yet Not Gripped by Detail," New York Times, 23 January 1991, p. A8; Paul Bedard, "Evidence of allied success elusive," Washington Times, 23 January 1991, p. A1.
31. William Branigin, "Collateral Damage: View From Ground Zero," Washington Post, 26 March 1991, p. A10.
32. "Our planes on alert until cease-fire firm," (Interview), USA Today, 20 March 1991, p. 12. The Washington Post reported on 22 February that "over the objections of senior Air



Force officials," Defense Department officials "suppressed a film showing a U.S. smart bomb early in the war accidentally striking a civilian building in downtown Baghdad, across from the Interior Ministry," R Jeffrey Smith, "Numerous U.S Bombs Probably Missed Targets," Washington Post, 22 February 1991, p. A1.

33. The amount of tonnage dropped, 63,000 tons per month in the Gulf War, was also more than in these two conflicts: 34,000 tons per month dropped during the Vietnam War, or the 22,000 tons per month dropped during the Korean War; See Paul F. Walker and Eric Stambler, "...And the Dirty Little Weapons," Bulletin of the Atomic Scientists, May 1991, p. 22.

34. Lionel A. Rosenblatt, Executive Director of Refugees International, "Statement before the Immigration and Refugee Affairs Subcommittee -- Committee on the Judiciary," US Senate, 15 April 1991, p. 2.

35. Philip Shenon, "Massing on Border," New York Times, 23 January 1991, p. 1.

36. William Branigin, "Kuwait's Environmental, Economic Nightmare," Washington Post, 14 March 1991, p. A1.

37. Michael Weisskopf, "Smoke Over Kuwait Poses Health Threat," Washington Post, 28 February 1991.

38. US Environmental Protection Agency, "Kuwait Oil Fires: Interagency Interim Report," 3 April 1991, p. 1.

39. Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A1.

40. Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1.

41. Matthew L. Wald, "Surge of Water Due to Well Fires To Cut Future Kuwaiti Oil Output," New York Times, 9 April 1991, p. A1.

42. UNEP, "Gulf War Oil Spill: UNEP Appeals for International Action," Press Release, 28 January 1991.

43. See, e.g., Statement of Representative Nancy Pelosi, "Environmental Consequences of the Gulf War," Congressional Record, 16 April 1991.

44. According to military sources, over 20 spills per year occurred throughout the 1980s in Kuwait and Saudi Arabia.

45. Jay Mathews, "Gulf Oil Spills Defy Easy Cleanup, Experts Conclude," Washington Post, 9 March 1991, p. A22.

46. Charles Sheppard and Andrew Price, "Will marine life survive the Gulf War?," New Scientist, 9 March 1991, p. 36.

47. Raymond W. Copson, "Persian Gulf Conflict: Post-War Issues for Congress," CRS Issue Brief 90132, 22 March 1991.

48. Report on Environmental Consequences of the Conflicts Between Iraq and Kuwait, by the Executive Director of the United Nations Environment Programme, n.d. (March), p. 14.

49. National Audubon Society, "Environmental Lessons of the War in the Persian Gulf: Ecological Recovery and Future Prevention," Fact Sheet (n.d.).

50. Just relating to oil fires, in 1905, oil wells and installations were set on fire in Baku during the first Russian revolution. In 1916, British soldiers set fire to Rumanian oil fields prior to the German invasion. See Daniel Yergin, The Prize (New York: Simon and Schuster, 1991).

51. Former US Attorney General Ramsey Clark, for instance, in his report on his visit to Iraq from 2-8 February, stated that "While the Iraqi military has the most extensive independent communications capacity in the country, the civilian phone facilities are not legitimate targets and the effort to bomb them necessarily takes civilian lives." (emphasis added)

## The War

52. "America at War," Newsweek magazine commemorative edition, Spring/Summer 1991, p. 38.
53. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 2.
54. With the invasion of Kuwait, Gen. Schwarzkopf described that:
- The Air Force [in Washington] jumped right in and came up with a very rudimentary essence of what started out to be the campaign plan. Very quickly Chuck Horner [commander of air forces for Central Command] made it clear to me that this was not the desired way of doing it, and we took the skeletal plan that was started in Washington and I shifted the whole thing over here [to Saudi Arabia]..."
- "Schwarzkopf: 'I Got a Lot of Guff,'" (Interview), Newsweek, 11 March 1991, p. 20. Gen. Schwarzkopf told Newsweek magazine that, "The guys that were going to be required to execute this plan felt very strongly that they should be the ones to make the plan..."
55. DOD News Briefing, Gen. "Tony" McPeak, 15 March 1991.
56. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.
57. Eric Schmitt with Michael R. Gordon, "Unforeseen Problems in Air War Forced Allies to Improvise Tactics," New York Times, 10 March 1991, p. A1.
58. Alan Gropman, "Success in Persian Gulf validates Air Force doctrine," Air Force Times, 18 March 1991, p. 23.
- There is some disagreement in descriptions of the war plan as to how flexible the air tasking order (ATO) actually was. The ATO was reportedly developed two to three days before publication. One Navy officer noted that "A drawback to the ATO is its lack of dynamism due to the relatively long planning time that precedes its issuance," CDR Steve Endacott, "Desert Storm Report," Wings of Gold, Spring 1991. Yet according to Gen. Butler, aircraft were "frequently given new targets enroute, and occasionally called off when targets became confused on a fluid battlefield;" Statement of General Lee Butler, Commander-in-Chief Strategic Air Command, to the House Armed Services Committee, 20 March 1991, p. 11.
59. Michael Ryan, "Here's to the Winners," Life Weekly, 18 March 1991, p. 32.
60. Edith M. Lederer, "Despite the fears, Iraq never used its chemical arms," Philadelphia Inquirer, 1 March 1991, p. 13.
61. Sean D. Naylor, "Ground assault termed textbook perfect," Air Force Times, 11 March 1991, p. 6.
62. Rowan Scarborough, "Ground attacks flush Iraqi units," Washington Times, 26 February 1991.
63. United Nations, Text of Security Council Resolution 678, 29 November 1990.
64. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.
65. "How Saddam was denied the skies," The Guardian (UK), 9 February 1991, p. 3.
66. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991. Gen. McPeak stated that the air defense system was comprised of "Lots of computer data links, fiberoptic connections, many of the principal control nodes hardened, buried concrete bunkers and so forth. This is a first class air defense -- not a featherweight opponent that we had to operate

against in the opening hours of the air war " See also comments in News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

67. These commands included the Defense Ministry and Air Force headquarters in Baghdad, intelligence headquarters, the Ministry for Industry and Military Industrialization, and Army and Navy headquarters (in Baghdad and in the south).

68. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991. Of the 594 aircraft shelters, 375 were damaged or destroyed. There were a total of 66 airfields, including main operating bases and dispersal airfields; News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

69. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

70. These locations reportedly include targets at abu Gharib, Akashat, al Fallujah, al Hillah, al Qaim, Baiji, Basra, Isis, Karbala, Mosul, Musayyib, Salman Pak, Samarra, Tuwaitha, and Zafaranya. The attacks were initially concentrated on production facilities and locations where Iraqi forces "fill munitions;" See News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

71. Navy F-18 and A-6 attacks evidently began against the Umm Qasr Naval Base and port facilities on 24 January, and naval attacks against land targets continued through the end of the war. Attacks were also mounted on 1 February against the Al Kalia naval facility, against Silkworm sites at Uum Qasabah on 5 February, and against Cor Al Zubayr on 8 February. Ships and missile sites were also attacked in the Bubiyan channel and in Kuwait City harbor, near Faylaka Island, and at the Min al Bakir oil terminal. Eventually 100 naval vessels and a half dozen Silkworm sites were destroyed. See Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.

72. The bridges were concentrated on the two roads south of Baghdad to Basra, as well as numerous bridges to the west of Baghdad.

73. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

74. These targets are reported to include the Bab al-Muadem Post Office, the national telecommunications center in Karkh, main telephone exchanges, the post office tower on Rashid street, and some seven telecommunications microwave relay towers around Baghdad.

75. These targets are believed to include the Doura, Kirkuk, and Qiayara oil refineries, and a major oil facility on an island in the Tigris river. On 29 January, F-18s destroyed the "control centers at an oil refinery at Basra;" Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.

76. FY 92 Air Force Posture, Statement of General Merrill McPeak, Presentation to the Senate Armed Services Committee, 19 March 1991, p. 1. These targets are believed to include the presidential palace, Foreign Ministry, Justice Ministry, Interior Ministry, Ministry for Municipal Affairs in Baghdad, the Ministry for Local Government, the Saddam Hussein conference center, and Arab Baath Socialist party headquarters in Alawichella. See Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.

77. "Saddam has a real problem," (Interview), USA Today, 25

March 1991, p. 7.

78. ABC News "Primetime Live." 24 January 1991. See James W. Canan, "Airpower Opens the Fight," Air Force Magazine, March 1991, p. 16. The Navy launched 228 combat sorties on the first day from six aircraft carriers.

79. While the command and control apparatus was the principle aim of the first day of attacks, strategic targets including airfields, biological and chemical weapons facilities, SCUD missile launchers and support facilities, and electrical power stations were also hit; DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991. See also Nora Boustany, "Selected Targets Hit on First Day of War," Washington Post, 18 January 1991.

80. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 3.

81. David A. Fulghum, "F-117 Pilots, Generals Tell Congress About Stealth's Value in Gulf War," Aviation Week & Space Technology, 6 May 1991, p. 66.

82. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.

83. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.

84. On 19 January, Gen. Powell stated that, although all types of targets continued to be attacked, there was already a shift in emphasis from attacking strategic targets to bombing "forces in theater."

85. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.

86. Jonathan C. Randal, "Turkish Assembly Approves Use of Air Bases for US Attacks," Washington Post, 18 January 1991; Clyde Haberman, "Ankara Authorizes Use of Mediterranean Base by U.S. for Attacks on Iraq," New York Times, 18 January 1991; Rick Atkinson and Ann Devroy, "US Claims Iraqi Nuclear Reactors Hit Hard; Saddam Minimizes Losses, Shows Off POWs," Washington Post, 21 January 1991, p. A1; DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.

87. FY 92 Air Force Posture, Statement of General Merrill McPeak, Presentation to the Senate Armed Services Committee, 19 March 1991, p. 1. See also Charles Miller, "British Decision to Allow B-52 Basing May Signal Longer Bombing Campaign," Defense News, 4 February 1991, p. 35.

88. On 29 January, French Defense Minister Jean-Pierre Chevenement resigned in opposition to the change in French government policy. "The logic of war risks driving us further every day from the objectives fixed by the United Nations," Chevenement wrote. The Italian naval chief also resigned after dovish remarks about the aims of the air war.

89. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51.

90. "Flexibility of Attack Aircraft Crucial To Crushing Iraq's Military Machine," Aviation Week & Space Technology, 22 April 1991, p. 46. According to Aviation Week, "Pressure from Marine aviators anxious to fight led to the release or 'chop' of AV-8 units to the theater air commander and their inclusion in daily combat operations deeper in Iraqi-occupied territory, officials said."

91. Statement of General Charles C. McDonald, Commander, Air Force Logistics Command, Logistics Support in Desert Storm & Logistics Programs in FY92-3, before the Senate Armed Services Committee, 17 April 1991, p. 5.

92. Lee Ewing, "Saudi: Air power could win war," Air Force Times, 4 March 1991, p. 6
93. Molly Moore and Guy Gugliotta, "Allies to Step Up Air Strikes Against Iraqi Ground Forces," Washington Post, 8 February 1991, p. A27.
94. CDR Steve Endacott, "Desert Storm Report," Wings of Gold, Spring 1991.
95. S-3 Viking aircraft from the USS America were used on 20 February for the first time to engage and destroy a hostile vessel when an Iraqi gunboat was hit by three 500-pound bombs; Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
96. Some of the increases were explainable for direct tactical purposes. For instance, from the first night of the air war, Iraqi aircraft flew to northern airfields to escape the bombing of southern bases, and attacks from Turkey assisted in denying Iraq a sanctuary in the north of the country; Molly Moore and Guy Gugliotta, "US Pilots Are Warned Not to Grow Complacent Over Ease of First Strikes," Washington Post, 18 January 1991, p. A1.
97. Interview with David Frost, PBS Network, 27 March 1991.
98. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
99. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 4.
100. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.
101. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
102. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.
103. "A Soldier of Conscience," Newsweek, 11 March 1991, p. 19.
104. William Claiborne, "We Thought of Nothing but Escape," Washington Post, 3 March 1991.
105. Carol Morello, "For many soldiers, a bumper-to-bumper war," Philadelphia Inquirer, 3 March 1991, p. 1.
106. Statement by General Carl E. Vuono, Chief of Staff, US Army, before the Senate Armed Service Committee, 19 March 1991.
107. John H. Cushman Jr., "Military Experts See a Death Toll of 25,000 to 50,000 Iraqi Troops," New York Times, 1 March 1991, p. 1.
108. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.
109. Douglas Jehl, "Truce Halts Tanks On Brink of Battle," Washington Post, 2 March 1991, p. 1.
110. John Pomfret, Associated Press, Pool Report with the 101st Airborne Division, 27 February 1991.
111. Gary Regenstreif, Reuters, Pool Report with the 82nd Airborne Division, 27 February 1991.
112. Ron Martz, Cox Newspapers, Pool Report with the 24th Infantry Division, 1 March 1991.
113. Douglas Jehl, Los Angeles Times, Pool Report with the 1st Armored Division, 25 February 1991.
114. Rick Atkinson, "Outflanking Iraq: Go West, 'Go Deep,'" Washington Post, 18 March 1991, p. 1.
115. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
116. Kirk Spitzer, Gannett News Service, Pool Report with the 1st Marine Division, 27 February 1991; See also Otto Kreisher, Copley News Service, Pool Report with the 1st Marine Division, 27 February 1991.
117. George Rodrigue, Dallas Morning News, Pool Report from Kuwait City, 27 February 1991; Gilles Trequesser, Reuters, Pool Report from Kuwait City, 27 February 1991.
118. John King, "In Open Kuwaiti Capital, Joy Amid the Ruins," Washington Post, 27 February 1991, p. A1.
119. Colin Nickarson, Boston Globe; and Susan Sachs, Newsday, Pool Report with the 2nd Marine Division, 26 February 1991. See also similar quotes in Denis D. Gray, Associated Press, Pool Report with the 2nd Marine Division, 26 February 1991; and Jeff Franks, Reuters, Pool Report with the "US Marines in Kuwait," 26 February 1991.
120. Bill Gannon, Newark Star-Ledger, Pool Report with the Tiger Brigade in occupied Kuwait, 27 February 1991.
121. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
122. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
123. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.
124. Rowan Scarborough, Washington Times, Pool Report aboard the USS Blue Ridge, 27 February 1991.
125. "After the Storm," Newsweek, 11 March 1991, p. 16.
126. Valerie Strauss, "Iraqi City of Basra Reported in Chaos," Washington Post, 3 March 1991, p. A35.
127. In Mosul, the Kurdish opposition stated that more than 4,000 political prisoners were released when jails were liberated; Greg Myre, "Saddam units retake major cities in south," Washington Times, 26 March 1991, p. 1.
128. R.W. Apple Jr., "Iraqi Clashes Said to Grow as Troops Join In Protests; First Allied Captives Freed," New York Times, 5 March 1991, p. 1.
129. These included Abu Skheir, Ali al-Gharbi, Amarah Basra, Diwanayah, Fahoud, Hillah, Karbala, Kumayt, Kut, Najaf, Nassiryah, Qadissiyah, Qalat Salih, Qurnah, Samawah, Shatra, Al Sulamaniyah, Suq ash-Shuyukh, Tar, Tikrit, and Zubayr in the south; and Dohuk, Kirkuk, Mosul, Raniya, and Tuz Khurmatu in the north. See Nora Boustany, "Refugees Tell of Turmoil in Iraq; Troops Recount Allied Onslaught," Washington Post, 4 March 1991, p. A1; Nora Boustany, "Republican Guard Reported Battling Insurgents in Iraq," Washington Post, 6 March 1991, p. 1; Elaine Sciolino, "Iraqi Gains Against Rebels Sometimes Fade, U.S. Says," New York Times, 13 March 1991, p. A13.
130. William E. Schmidt, "Iran Says Iraqi Leader Will Soon Fall to Rebels," New York Times, 19 March 1991, p. 15.
131. Patrick E. Tyler, "Copters a Threat, U.S. Warns Iraqis," New York Times, 19 March 1991, p. 14.
132. Barton Gellman, "U.S. Downs Iraqi Jet as Insurgency Continues," Washington Post, 21 March 1991, p. 1.
133. John M. Goshko, "Kurds Ousted From Kirkuk, Baghdad Says," Washington Post, 29 March 1991. See also Patrick E. Tyler, "U.S. Sees Hussein Close to Victory Over Shiite Foes," New York Times, 26 March 1991, p. 1.
134. Elaine Sciolino, "Iraqi Gains Against Rebels Sometimes Fade, U.S. Says," New York Times, 13 March 1991, p. A13.
135. Physicians for Human Rights, "Press Statement: Iraq Mission April 3-10, 1991," 15 April 1991, p. 4.

136. Mediciens Sans Frontieres USA, Inc. ("Doctors Without Borders"), "Statement by Dr. Marcel Roux Regarding the Dramatic Situation in Kurdish Iraq and on the Iraq Turkey Border," Presented to the Human Rights Caucus, 11 April 1991, p. 1.
137. John M. Goshko, "Kurds Ousted From Kirkuk, Baghdad Says," Washington Post, 29 March 1991.
138. Barton Gellman, "U.S. Downs Iraqi Jet as Insurgency Continues," Washington Post, 21 March 1991, p. 1.
139. DOD News Briefing, 4 April 1991.
140. "Thousands Flee as Iraqi Troops Shell a Northern Kurdish City," New York Times, 31 March 1991.
141. DOD News Briefing, 4 April 1991.

### The Human Cost of the War

142. Initially, the International Red Cross estimated that 300,000 people would be displaced by the fighting; International Red Cross, "Middle East Conflict: Position of the ICRC," Bulletin, February 1991, p. 4.
143. Susan Okie, "Health Official Sees Threat of Epidemics in Iraq," Washington Post, 26 February 1991.
144. Iraq has nearly 19 million people. Of those, 45 percent are under age 15, and 68 percent live in urban areas. Ninety-seven percent of the population is Muslim, with 60-65 percent being Shiite and 32-37 percent being Sunni. The remaining three percent of the population is either Christian or another religion; 1991 CIA World Fact Book.

Iraq's birth rate is 3.9 percent; the second highest in the world, and its population could double within 20 years; Alex Sherbinin, Spotlight: Iraq (Washington, DC: The Population Reference Bureau, 1991).

Before the war Kuwait had a estimated population of 2.1 million. Of those, 37 percent were under age 15. Ninety-four percent lived in urban areas. The population in Kuwait is 85 percent Muslim, with 45 percent being Sunni and 30 percent being Shiite. The remaining 10 percent of the population is divided among numerous other Muslim affiliations. The rest of the Kuwaiti population, 15 percent, is divided among Christians, Hindus and practitioners of other religions.

Kurdish people number nearly 10.4 million; 9.3 million in the region. Fairly conservative estimates would place 15 percent (2.9 million) in Iraq and 3.4 million in Turkey. In Iran, the Kurds are thought to number 3 million, and in Syria 800,000; Richard V. Weekes, Muslim Peoples: A World Ethnographic Survey (Westport, CT: Greenwood Press, 1984), p. 421. No fewer than 2.5 million Kurds are currently refugees, almost one-third of the Kurdish population.

145. United Nations Security Council, "Report to the Secretary-General on humanitarian needs in Kuwait in the immediate post-crisis environment...," 28 March 1991, p. 3

146. International Labor Organization, Press Release, 12 February 1991.

Some 3 million foreign workers and technicians were estimated to be working in Kuwait and Iraq prior to Iraq's invasion of Kuwait. Estimates vary, but approximately 1.2-1.6 million foreigners were residing in Iraq and about 1.4-1.8 in Kuwait. Almost 20 percent -- 162,992 people were repatriated through Jordan between August and November; Office of the United Nations Disaster Relief Organization Coordinator, "The Iraq/Kuwait Crisis: International Assistance to Displaced People Through Jordan: August-November 1990," p. 7. By

February, the number of people estimated to have left was 2 million. Iraq's large population, however, makes it much less dependent on foreign labor than other states in the region and therefore more stable.

147. CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-22.

148. UNICEF, "Overview of the Gulf Situation," 26 March 1991.

149. James Gerstenzang, "Tens of Thousands of Iraqi Soldiers' Bodies Left Behind," Los Angeles Times, 1 March 1991, p. 8.

150. Walter S. Mossberg and David Rogers, "Iraqi Troop Deaths Totaled At Least 100,000, U.S. Says," Wall Street Journal, 22 March 1991, p. 10.

151. On 1 March, the New York Times estimated that 25,000-50,000 Iraqi soldiers probably died in the six week war, but quoted Saudi officials as estimating 85,000-100,000 combatants killed and wounded; John H. Cushman Jr., "Military Experts See a Death Toll of 25,000 to 50,000 Iraqi Troops," New York Times, 1 March 1991, p. 1. See also James Gerstenzang, "Tens of Thousands of Iraqi Soldiers' Bodies Left Behind," Los Angeles Times, 1 March 1991, p. 8. The London Times reported on 3 March that allied intelligence believed that as many as 200,000 Iraqis may have died in the Gulf war; James Adams, "Iraqi Toll could be 200,000 dead," Times (London), 3 March 1991.

152. Some military analysts have made estimates based upon historical data relating to casualties in previous wars, comparing possible deaths per ton of ordnance dropped. These estimates tend to question the 100,000-level figures. A weakness in the methodology could be in assuming a constant level of killing efficiency for air bombardments, an assumption that does not seem to be particularly convincing given the nature of the battlefield, the static nature of the Iraqi defenses, and the rout of ground forces at the end of the war. For comparison, for instance, some 3,000,000 North Vietnamese, Cambodian, and Laotian deaths occurred in the Vietnam War, or an average of some 1,100 people a day during the seven year, four month war. Assuming only those military and civilian deaths during the 43-day war, some 110,000-135,000 Iraqis died, or an average of 2,500-3,000 daily.

153. R. Jeffrey Smith, "Congress to Probe U.S. Intelligence on Iraq," Washington Post, 18 March 1991, p. 14.

154. Patrick E. Tyler, "Powell Says U.S. Will Stay in Iraq 'for some months,'" New York Times, 23 March 1991, p. 1.

155. The first Iraqi prisoners were returned to Iraq on 6 March, when 294 POWs were handed over to the ICRC. On 15 and 17 March respectively, the ICRC repatriated 499 and 500 Iraqi POWs to Iraq; by 4 April, the number had jumped to 18,730. On April 7, the ICRC stated that it had successfully repatriated 40,000 POWs through the ground team in Saudi Arabia. By the beginning of May, most, if not all, Iraqi POWs had been repatriated.

156. James Adams, "Iraqi Toll could be 200,000 dead," Times (London), 3 March 1991.

157. R. Jeffrey Smith, "U.S. Has, but Won't Release, Tally of Buried Iraqi Soldiers," Washington Post, 26 March 1991, p. A11.

158. James Gerstenzang, "Tens of Thousands of Iraqi Soldiers' Bodies Left Behind," Los Angeles Times, 1 March 1991, p. 8.

159. R. Jeffrey Smith, "U.S. Says It Buried 444 Iraqi Soldiers," Washington Post, 29 March 1991.

160. James Gerstenzang, "Tens of Thousands of Iraqi Soldiers'

Bodies Left Behind," Los Angeles Times, 1 March 1991, p. 8.

161. Douglas Jehl, "Truce Halts Tanks On Brink of Battle," Washington Post, 2 March 1991, p. 1.

162. Rick Atkinson and Steve Coll, "Bush Orders Cease-Fire," Washington Post, 28 February 1991, p. A1

163. Walter S. Mossberg and David Rogers, "Iraqi Troop Deaths Totaled At Least 100,000, U.S. Says," Wall Street Journal, 22 March 1991, p. 10.

British military personnel also were involved in burying Iraqis; Robert Fox, "Mounds of dead 'just one of those things,'" Washington Times, 5 March 1991.

164. R. Jeffrey Smith, "U.S. Says It Buried 444 Iraqi Soldiers," Washington Post, 29 March 1991.

165. Eric Schmitt, "Captives Return to Iraq Delayed," New York Times, 13 March 1991; R. Jeffrey Smith, "U.S. Has, but Won't Release, Tally of Buried Iraqi Soldiers," Washington Post, 26 March 1991, p. A11; R. Jeffrey Smith, "U.S. Says It Buried 444 Iraqi Soldiers," Washington Post, 29 March 1991.

166. R. Jeffrey Smith, "U.S. Has, but Won't Release, Tally of Buried Iraqi Soldiers," Washington Post, 26 March 1991, p. A11.

167. DOD News Briefing, Gen. "Tony" McPeak, 15 March 1991, Ian Kemp, "100-hour war to free Kuwait," Jane's Defence Weekly, 9 March 1991, p. 326; Hansard, 19 March 1991, p. 90; Hansard, 8 March 1991, p. 330; Clyde R. Mark, "Iraq's Invasion of Kuwait: A Review of Events," CRS Issue Brief 90118, 22 March 1991.

168. Patrick E. Tyler, "American War Prisoners Abused By Iraqi Captors, Pentagon Says," New York Times, 13 March 1991; William Keikirk, "Accidents killed most GIs in gulf," Chicago Tribune, 24 March 1991, p. 1.

169. Eric Schmitt, "Captives Return to Iraq Delayed," New York Times, 13 March 1991.

170. AP, "Kuwait Seeks Hanging For 600," 20 March 1991, in Current News Early Bird, 20 March 1991, p. 16.

171. R. Jeffrey Smith, "Massive Effort May Be Needed to Rebuild Kuwait," Washington Post, 26 February 1991, p. A12.

172. Clyde R. Mark, "Iraq's Invasion of Kuwait: A Review of Events," CRS Issue Brief 90118, 22 March 1991, p. 9.

173. Paul Lewis, "Iraqi Moves May Fall Short," New York Times, 6 March 1991, p. 1 ff.

174. American Red Cross, "International Red Cross & Red Crescent Movement Emergency Relief and Humanitarian Assistance in the Middle East," 25 March 1991.

175. UPI, "UN Sets Up Body to Destroy Iraq's Heavy Weapons," 23 April 1991.

176. New York Times, 28 January 1991, p. A8.

177. Alan Cowell, "Iraq Suspending Fuel Sales, As Raid Widens Shortages," 6 February 1991, p. A11.

178. Clyde R. Mark, "Iraq's Invasion of Kuwait: A Review of Events," CRS Issue Brief 90118, 22 March 1991, p. 5.

179. Henry Selz, "Iraq Trip Report: Amman/Baghdad/Karbala/ Baghdad/Amman," 24-28 March 1991, The American Friends Service Committee, 6 April 1991, p. 2.

180. United Nations, "UNDRO Says 708,970 Third Country Nationals Evacuated From Jordan In Iraq-Kuwait Crisis," Press Release, 16 October 1990.

181. The largest number of workers were from Egypt; International Labor Organization, Washington Branch, ILO News, 12 February 1991, p. 1.

182. Many of these countries are "developing" nations -- with

huge debts. As many as 377,000 people returned to India, Pakistan, Sri Lanka, Bangladesh, the Philippines, and Thailand. As their remittances and export revenues decline and the price of imported oil goes up, many of these nations will experience worsening problems with the balance of payments according to the ILO; International Tripartite Round Table on International Labour Migration, Arab and Asian Countries: A Summary, 11-12 December 1990.

183. Jordan was in the center of the repatriation efforts for foreign workers. There were an estimated 700,000 third country nationals who were evacuated to Jordan and repatriated to third countries -- the highest numbers came from Egypt and India. Estimates show that over 500,000 migrant workers returned to Egypt during the first three months of the occupation. See ILO Tripartite Round Table on International Labour Migrations, Arab and Asian Countries: A Summary, 11-12 December 1990; and ILO USA, Press Release, 12 February 1991; United Nations, "UNDRO Says 708,970 Third Country Nationals Evacuated From Jordan In Iraq-Kuwait Crisis," Press Release, 16 October 1990.

184. Tom Diaz, "Iraqi Revolt Still Rages," Washington Times, 19 March 1991, p. A1.

185. Jonathan C. Randal, "Army Offensive Repelled, Iraqi Opposition Says," Washington Post, 19 March 1991.

186. Jonathan C. Randal, "Iraq Says Rebellion Toll High," Washington Post, 18 March 1991, p. 1.

187. Physicians for Human Rights, "Press Statement: Iraq Mission April 3-10, 1991," 15 April 1991, p. 4.

188. Tom Diaz, "Iraqi revolt still rages," Washington Times, 19 March 1991, p. 1.

189. DOD News Briefing, 4 April 1991.

190. Amnesty International USA, Amnesty International Call For Protection Of People Fleeing Iraq, 4 April 1991, p.1

191. "Defeat and Flight," Time Magazine, 15 April 1991, p. 16.

192. Edward A. Gargan, "Kuwait Will Begin Trying Collaboration Suspects," New York Times, 10 May 1991.

193. United Nation High Commissioner For Refugees, "Gulf Operation" (Internal document summarizing released information), 17 April 1991, p. 1.

194. "Death Every Day," Time Magazine, 22 April 1991, p. 15.

195. Mary Beth Sheridan, "Influx of Kurds Tough on Coalition," Washington Times, 17 May 1991.

#### Destruction in Kuwait and Iraq

196. Letter Dated 20 March 1991 from the Secretary-General addressed to the President of the Security Council, 20 March 1991 (S/22366), enclosing Report by Under-Secretary-General Martti Ahtisaari. (hereafter Ahtisaari Report)

197. Erika Munk, "The New Face of Techno-War," The Nation, 6 May 1991, p. 583.

198. Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.

199. Erika Munk, "The New Face of Techno-War," The Nation, 6 May 1991, p. 583.

200. Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.

201. Michael Ryan, "Here's to the Winners," Life Weekly, 18 March 1991, p. 32.

202. Michael Kelly, "In occupiers' wake, tales of brutality," Boston Globe, 28 February 1991, p. 1.

203. Rick Atkinson and William Claiborne, "Allies Surround

- Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
204. Caryle Murphy, "Kuwaitis Resisted, Survived," Washington Post, 4 March 1991, p. A1.
205. Rodney Pinder, "Rich nation left defiled," Washington Times, 5 March 1991, p. A1.
206. Laura Litvan and Jay Mallin, "Race is on for Kuwait projects," Washington Times, 5 March 1991, p. A1.
207. Michael Kelly, "In occupiers' wake, tales of brutality," Boston Globe, 28 February 1991, p. 1.
208. Caryle Murphy, "Kuwaitis Resisted, Survived," Washington Post, 4 March 1991, p. A1.
209. "Iraqis raze Kuwaiti buildings," Washington Times, 25 February 1991, p. A9; Donatella Lorch, "A Shattered City Struggles for Life," New York Times, 1 March 1991, p. 1; Rodney Pinder, "Rich nation left defiled," Washington Times, 5 March 1991, p. A1; Bruce Wallace, "Joy Among the Ruins," MacLean's, 11 March 1991, p. 24; Donatella Lorch, "Kuwaiti Broadcasts Resume After Pillaging," New York Times, 13 March 1991.
210. Rodney Pinder, "Rich nation left defiled," Washington Times, 5 March 1991, p. A1.
211. Stuart Auerbach, "Contracts Awarded For Kuwait Cleanup," Washington Post, 5 March 1991, p. D1.
212. "UN Special Mission Holds Sectoral Discussion with Kuwaiti Officials; Visits Sites Critical to its Mandate," Press Release, 18 March 1991.
213. Fred Pearce, "Kuwait's oil wells send smoke to Iraq," New Scientist, 2 March 1991, p. 12; Bill Gertz, "Tab to rebuild Iraq, Kuwait estimated at \$100 billion," Washington Times, 4 March 1991, p. A10. There are three refineries, at Mina al Ahmadi, Mina Abdullah, and Shuaiba. See R.D. Small, "Environmental Impact of Damage to Kuwaiti Oil Facilities," PSR Note 1000, Pacific-Sierra Research Corporation (Los Angeles, CA), 11 January 1991; David Thomas and Jimmy Burns, "Kuwaitis prepare for the ultimate oil disaster," Financial Times (London), 13 February 1991, p. 3.
214. William Branigin, "Kuwait's Environmental, Economic Nightmare," Washington Post, 14 March 1991, p. A1; Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A1; Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1.
215. Jeff Franks, Reuters, Pool Report from Kuwait City, 27 February 1991.
216. "Kuwait: Rape of a Nation," Newsweek, 11 March 1991, p. 33.
217. Gilles Trequesser, Reuters, Pool Report from Kuwait City, 27 February 1991.
218. Molly Moore, Washington Post, Pool Report from Kuwait City, 28 February 1991.
219. Donatella Lorch, "A Shattered City Struggles for Life," New York Times, 1 March 1991, p. 1.
220. Stuart Auerbach, "Contracts Awarded For Kuwait Cleanup," Washington Post, 5 March 1991, p. D1.
221. Michael Hedges and Elisabeth Hickey, "Kuwaiti troops mop up," Washington Times, 4 March 1991, p. 1.
222. Richard Zoglin, "What is Left of Kuwait?," Time Magazine, 4 March 1991, p. 34.
223. Discussions with Air Force officials; see also Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
224. Ray Wilkinson, Newsweek, Pool Report with the Marine in Kuwait City, 26 February 1991.
225. Ray Wilkinson, Newsweek, Pool Report on the outskirts of Kuwait City, 26 February 1991.
226. Michael Hedges and Elisabeth Hickey, "Kuwaiti troops mop up," Washington Times, 4 March 1991, p. 1.
227. Jeff Franks, Reuters, Pool Report from Kuwait City, 27 February 1991.
228. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
229. Gilles Trequesser, Reuters, Pool Report from Kuwait City, 27 February 1991; Donatella Lorch, "A Shattered City Struggles for Life," New York Times, 1 March 1991, p. 1; Kate Webb, "Animals starve, carcasses rot at the Kuwait Zoo," Washington Times, 8 March 1991.
230. Tom Diaz, "Basic needs still unmet in Kuwait," Washington Times, 18 March 1991.
231. Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1.
232. Donatella Lorch, "A Shattered City Struggles for Life," New York Times, 1 March 1991, p. 1.
233. Alan Cowell, "More Precious Than Oil," New York Times, 17 March 1991.
234. Ahtisaari Report.
235. Inter Press Service (Amman), "Baghdad, Images of a City Devastated," 1 March 1991.
236. "Saddam said to lead reconstruction effort," Washington Times, 4 March 1991, p. A10.
237. Physicians for Human Rights, "Press Statement: Iraq Mission April 3-10, 1991," 15 April 1991, p. 3.
238. Henry Selz, "Iraq Trip Report: Amman/Baghdad/Karbala/ Baghdad/Amman, 24-28 March 1991," The American Friends Service Committee, 6 April 1991, p. 6.
- At the end of April, hospitals were still not operating at full capacity. This was due in part to a lack of energy, but also because transportation to them remained extremely limited.
239. United Nations Association of the United States of America, "The United Nations Response to the Gulf Conflict: Political, economic, humanitarian, environmental, and social aspects," 7 March 1991, p. 6.
240. Henry Selz, "Iraq Trip Report: Amman/Baghdad/Karbala/ Baghdad/Amman," 24-28 March 1991, The American Friends Service Committee, 6 April 1991, p. 3.
241. Ahtisaari Report.
242. On 28 January, Bob Woodward of the Washington Post reported that "eleven of Iraq's 12 major petrochemical facilities, including three refineries, have received moderate damage;" Bob Woodward, "Key Iraqi Assets Said to Survive 10-Day Air War," Washington Post, 28 January 1991, p. 1. The Basra oil refinery was one of the refineries to be attacked; Fred Pearce, "Kuwait's oil wells send smoke to Iraq," New Scientist, 2 March 1991, p. 12.
243. Save the Children, "Iraq: Assessment Team Report, Part I," 21 March 1991, p. 2.
244. Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.
245. Ahtisaari Report.
246. Ahtisaari Report.
247. Save the Children, "Iraq Assessment Team Report: Part II," 30 March 1991, p. 3.

248. Ahtisaari Report.
249. Lee Hockstader, "Baghdad Residents Face Health Crisis," Washington Post, 4 March 1991, p. A1.
250. Save the Children, "Iraq Assessment Team Report: Part II," 30 March 1991, p. 3.
251. Lee Hockstader, "Baghdad Residents Face Health Crisis," Washington Post, 4 March 1991, p. A1.
252. Ahtisaari Report.
253. Save the Children, "Iraq: Assessment Team Report, Part I," 21 March 1991, p. 1.
254. Save the Children and Oxfam (UK), "Assessment of Conditions Affecting the Civilian Population in Iraq," 21 March 1991, p. 1.
255. UNICEF (Washington, DC), "Overview of Gulf Situation," 26 March 1991.
256. "Epidemic is Feared in Iraq," New York Times, 27 February 1991; "Iraqi Hospitals in Dire Shape, Foreign Doctors Group Finds," New York Times, 17 March 1991.
257. Susan Okie, "Health Official Sees Threat of Epidemics in Iraq," Washington Post, 26 February 1991.
258. Save the Children, "Iraq Assessment Team Report: Part II," 30 March 1991, p. 2.
259. Susan Okie, "Health Official Sees Threat of Epidemics in Iraq," Washington Post, 26 February 1991.
260. Lee Hockstader, "Baghdad Residents Face Health Crisis," Washington Post, 4 March 1991, p. A1.
261. Nora Boustany, "A Trail of Death in Iraq," Washington Post, 26 March 1991, p. 1.
262. Susan Okie, "30,000 Fleeing War Get Shelter in Iran, U.N. Officials Say," Washington Post, 20 March 1991, p. A14.
263. Save the Children, Iraq: Assessment Team Report Part I, 21 March 1991, p.3
264. Save the Children, "Iraq Assessment Team Report: Part II," 30 March 1991, p. 4.
265. Ahtisaari Report.
266. Ahtisaari Report.
267. Ahtisaari Report.
268. Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.
269. Iraqi authorities claimed in early March that some 72,000 persons were homeless, and calculated that approximately 9,000 homes were destroyed or damaged beyond repair during the war, of which 2,500 were in Baghdad and 1,900 were in Basra; Ahtisaari Report.
270. Ahtisaari Report.
271. Mark Fineman, "Smoke Blots Out Sun in Bomb-blasted Basra," Los Angeles Times, 5 February 1991.
272. Carol Rosenberg, "Scenes of war's havoc," Philadelphia Inquirer, 10 February 1991, p. 1A.
273. American Red Cross, "International Red Cross & Red Crescent Movement Emergency Relief and Humanitarian Assistance in the Middle East," 25 March 1991.
274. The UN stated that it may take anywhere from 4 to 13 months to restore power to minimal levels; Ahtisaari Report.
- An Iraqi official stated at the end of February that it would take at least a year to restore electricity supplies in Baghdad, "where the electric power station has been completely burnt to the ground;" Inter Press Service (Amman), "Baghdad, Images of a City Devastated," 1 March 1991.
275. United Nations Security Council, "Report to the Secretary-General on humanitarian needs in Kuwait...led by Mr. Martti Ahtissari," 28 March 1991, p. 5.
276. United Nations Association of the United States of America, The United Nations Response to the Gulf Conflict: "Political, economic, humanitarian, environmental, and social aspects," 7 March 1991, p.10
277. Save the Children, "Iraq: Assessment Team Report, Part I," 21 March 1991, p. 4.
278. Due to breakdowns in communications throughout the country, one was not functioning in March; Save the Children, "Iraq: Assessment Team Report, Part I," 21 March 1991, p. 2.

#### The Effect of the War on the Natural Environment

279. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
280. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
281. UNEP reported the size of the main slick as 120-130 km long and 5.25 km wide; UNEP, "UNEP Reports Oil Slick Less Than Anticipated and Takes Further Steps to Minimize Environmental Damage of Gulf War," Press Release, 22 February 1991; Report on Environmental Consequences of the Conflicts Between Iraq and Kuwait, by the Executive Director of the United Nations Environment Programme, n.d. (22 February 1991), p. 10.
282. On 20 February, Saudi officials announced that the slick contained 1.5-2 million barrels. This new estimate was based on the Saudi Meteorological Environmental Protection Agency's (MEPA) interpretation of satellite pictures taken on 24 January. See also David C. Morrison, "War on the Environment," National Journal, 2 March 1991, p. 536; D'Arcy Jenish, "War's Dark Tide: Canada helps to fight the Gulf oil spills," Maclean's (Canada), 4 March 1991.
283. There are believed to be about a dozen different sources of oil in the water. The New York Times reported on 7 April that seven tankers had spilled oil, but only six can be accounted for; see "Gulf Oil Spill Vexing Cleanup Efforts," New York Times, 7 April 1991.
- On 19 January, US and Kuwaiti forces attacked 11 offshore oil platforms near Kuwait that the Iraqis were using as bases for anti-aircraft fire. There were no reports as to whether these attacks resulted in any spillage of oil.
- On 11 February, British military spokesmen showed off the results of precision bombing of an Iraqi oil storage tank, although no information was provided as to the location or effects; CBS Evening News, 11 February 1991.
284. "Gulf Oil Spill Vexing Cleanup Efforts," New York Times, 7 April 1991.
285. Private Communications with the authors; see also Kimberly Dozier, "Saudis Want Financial, Technical Help on Spill," Defense Week, 25 February 1991, p. 6.
286. "Gulf Oil Spill Vexing Cleanup Efforts," New York Times, 7 April 1991.
287. Estimates for the volume from this spill alone were reported by Saudi Arabia's Meteorological and Environmental Protection Administration to be about 7 million barrels (294 million gallons).
288. The Mina al Bakr spill was reported in the last week of January. On 30 January, Gen. Schwarzkopf stated that the Mina al Bakr oil terminal had been "leaking for several days now." Gen. Schwarzkopf said that the terminal had been "attacked for several reasons in the past....Frankly, if it gets out of control, I will try and do exactly what we did with the other

one, if we have to;" CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

289. Dr. Andrew R.G. Price, "Possible Environmental Threats from the Current Gulf War," Report prepared for Greenpeace UK, 2 February 1991.

290. Charles Sheppard and Andrew Price, "Will marine life survive the Gulf War?," New Scientist, 9 March 1991, p. 36; "Saudis prepare to clear oil from troubled waters," New Scientist, 23 March 1991, p. 20.

291. "Gulf Oil Spill Vexing Cleanup Efforts," New York Times, 7 April 1991.

292. There is both a relatively low turnover time (time to mix water in the Gulf) and flushing time (time to exchange water in the Gulf), which have been estimated to be in the range of 3-5 years. Consequently, pollutants entering the Gulf are likely to reside there for a considerable time; Dr. Andrew R.G. Price, "Possible Environmental Threats from the Current Gulf War," Report prepared for Greenpeace UK, 2 February 1991.

293. The flats have very poor drainage, and at ebb tide thin sheets of trapped water form extensive and very shallow tide pools. Within these mud flats, mangroves are especially sensitive to oil because they actively trap sediment and bind it together with an extensive root system, thus gradually extending the tidal flat seaward. See also Charles Sheppard and Andrew Price, "Will marine life survive the Gulf War?," New Scientist, 9 March 1991, p. 36.

294. Charles Sheppard and Andrew Price, "Will marine life survive the Gulf War?," New Scientist, 9 March 1991, p. 36.

295. Dr. Andrew R.G. Price, "Possible Environmental Threats from the Current Gulf War," Report prepared for Greenpeace UK, 2 February 1991.

296. "Turtles face breeding catastrophe as Gulf slick cuts off nesting sites," Sunday Times (London), 17 February 1991.

297. Fishery closures occurred after the 1983 Nowruz spill because fish flesh had been tainted with oil. Dubai, for example, banned the import of fish from other Gulf States because of this problem.

298. D'Arcy Jenish, "War's Dark Tide: Canada helps to fight the Gulf oil spills," Macleans, 4 March 1991.

299. Thomas W. Lippman, "Gulf War Leaves Environment Severely Wounded," Washington Post, 2 March 1991.

300. Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1.

301. CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-13.

302. Philip Shenon, "Massing on Border," New York Times, 23 January 1991, p. 1; CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-10.

303. Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1.

On 24 January, the Pentagon announced that there were four large and three small fires in pipelines or pumping stations, and that smoke was rising from a small refinery in Kuwait. Aerial photographs of the fires were released to the press on 24 January, and fires were reported continuing at least through 26 January.

304. Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1.

305. Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1.

306. Jack Payton, St. Petersburg Times, Pool Report from the

Al-Wafra Oilfields, 27 February 1991.

307. Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1; US Environmental Protection Agency, "Kuwait Oil Fires: Interagency Interim Report," 3 April 1991, p. 1.

Of Kuwait's 743 wells in seven fields, 363 were active producing wells, and 380 were inactive.

308. William Branigin, "Kuwait's Environmental, Economic Nightmare," Washington Post, 14 March 1991, p. A1.

309. Matthew L. Wald, "Surge of Water Due to Well Fires To Cut Future Kuwaiti Oil Output," New York Times, 9 April 1991, p. A1.

310. Donatella Lorch, "Burning Wells Turn Kuwait Into Land of Oily Blackness," New York Times, 6 March 1991, p. A1.

311. Greg Myre, "Oil-well fires darken skies, recovery hopes in Kuwait," Washington Times, 8 March 1991, p. A1.

312. John Kifner, "None of Kuwait's Oil Well Fires Put Out Yet," New York Times, 1 April 1991.

313. Over 80 percent of Kuwaiti oil production is concentrated in the al Burgan field (210 wells) and the Magwa field (71 wells); see also Donatella Lorch, "Burning Wells Turn Kuwait Into Land of Oily Blackness," New York Times, 6 March 1991, p. A1; "Kuwaitis open fire on oil blazes," Washington Times, 14 March 1991.

314. Thomas W. Lippman, "Gulf War Leaves Environment Severely Wounded," Washington Post, 2 March 1991.

315. Youssef M. Ibrahim, "Another War Begins as Burning Oil Persists," New York Times, 18 March 1991; Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1; Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A1; Lee Hockstader, "Fighting the Great Balls of Fire," Washington Post, 1 April 1991, p. D1; Matthew L. Wald, "Surge of Water Due to Well Fires To Cut Future Kuwaiti Oil Output," New York Times, 9 April 1991, p. A1.

316. Christopher Joyce and Dan Charles, "The battle to stop the Gulf from choking," New Scientist, 23 March 1991, p. 20; US Environmental Protection Agency, "Kuwait Oil Fires: Interagency Interim Report," 3 April 1991, p. 1.

317. Donatella Lorch, "Burning Wells Turn Kuwait Into Land of Oily Blackness," New York Times, 6 March 1991, p. A1.

318. US Environmental Protection Agency, "Kuwait Oil Fires: Interagency Interim Report," 3 April 1991, p. 1.

319. Michael Wines, "Health Threat From Oil Fires May Rise in Summer," New York Times, 5 April 1991, p. A10. Mohamed Bakr Amin, manager of the water resources and environment division of the King Fahd University's Research Institute, said that the oil fires were venting "35 million cubic meters of methane, ethane, propane and butane every day, along with tons of particles of solid matter;" Tom Diaz, "Oil fumes pose big health risk," Washington Times, 26 March 1991.

320. Greg Myre, "Oil-well fires darken skies, recovery hopes in Kuwait," Washington Times, 8 March 1991, p. A1; Lee Hockstader, "UN Official Urges Fast Assessment of Health Risks Posed by Oil Fires," Washington Post, 29 March 1991, p. A1.

The gas, which is odorless and colorless, can kill a person who is exposed to even a small amount.

321. Thomas W. Lippman, "Gulf War Leaves Environment Severely Wounded," Washington Post, 2 March 1991.

322. Martin Marris (Associated Press) (Dahran), "Gulf



- Environment," 10 March 1991; Susan Okie, "30,000 Fleeing War Get Shelter in Iran, U.N. Officials Say," Washington Post, 20 March 1991, p. A14.
323. Marlise Simons, "Oil Wells Threaten a Region's Ecology," New York Times, 18 March 1991; Reuters, "Pakistan Gets Black Rain Caused by Kuwaiti Oil Fires," 4 April 1991.
324. Eric Schmitt, "Fouled Region is Casualty of War," New York Times, 3 March 1991.
325. DPA (New Delhi), "Black Rain is Reported in Northern India," 1 April 1991; Xinhua (New Delhi), "India Probes into Black Snow," 2 April 1991.
326. Marlise Simons, "Oil Wells Threaten a Region's Ecology," New York Times, 18 March 1991.
327. Marlise Simons, "Oil Wells Threaten a Region's Ecology," New York Times, 18 March 1991.
328. UPI (Thomas Ferraro, Kuwait City), "Dead birds may signal danger for man," 6 April 1991.
329. Martin Marris (Associated Press) (Dahran), "Gulf Environment," 10 March 1991.
330. US Environmental Protection Agency, "Kuwait Oil Fires: Interagency Interim Report," 3 April 1991, p. 1.
331. Michael Wines, "Health Threat From Oil Fires May Rise in Summer," New York Times, 5 April 1991, p. A10.
332. Jay Mathews, "Gulf Oil Spills Defy Easy Cleanup, Experts Conclude," Washington Post, 9 March 1991, p. A22.
333. Eric Schmitt, "Fouled Region is Casualty of War," New York Times, 3 March 1991.
334. Jay Mathews, "Gulf Oil Spills Defy Easy Cleanup, Experts Conclude," Washington Post, 9 March 1991, p. A22.
335. Charles Sheppard and Andrew Price, "Will marine life survive the Gulf War?," New Scientist, 9 March 1991, p. 36.
336. "Big test for bioremediation," Nature, 7 February 1991, p. 447.
337. AFP (Manama), "Oil Slick in the Gulf Breaks Up But Still Threatens Desalination Plants," 10 March 1991.
338. "Gulf Oil Spill Vexing Cleanup Efforts," New York Times, 7 April 1991.
339. "Saudis prepare to clear oil from troubled waters," New Scientist, 23 March 1991, p. 20.
340. Raymond W. Copson, "Persian Gulf Conflict: Post-War Issues for Congress," CRS Issue Brief 90132, 22 March 1991.
341. Lee Hockstader, "Crews 'Fiddle' But Well Burns; Texans Tackle Kuwaiti Blaze," Washington Post, 31 March 1991; "Firefighters Extinguish Kuwait Oil-Well Blaze," New York Times, 8 April 1991.
342. Matthew L. Wald, "Surge of Water Due to Well Fires To Cut Future Kuwaiti Oil Output," New York Times, 9 April 1991, p. A1.
343. John Kifner, "None of Kuwait's Oil Well Fires Put Out Yet," New York Times, 1 April 1991.
344. Greg Myre, "Oil-well fires darken skies, recovery hopes in Kuwait," Washington Times, 8 March 1991, p. A1.
345. David Maraniss, "No Computers Needed, Pahlner, as Firefighters Face Kuwait Infernos," Washington Post, 9 March 1991, p. A3. By early April, nevertheless, Kuwaiti oil officials were complaining about the pace of the fire fighting efforts; Matthew L. Wald, "Surge of Water Due to Well Fires to Cut Future Kuwaiti Oil Output," New York Times, 9 April 1991, p. A1.
346. UPI (New York), "Kuwaiti Oil Fires Could Burn Four Years, Reconstruction Director Says," 28 February 1991.
- Understanding Modern War**
347. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
348. CENTCOM Briefing, Brig. Gen. Richard I. Neal, 11 February 1991, 10:00 AM (emphasis added).
349. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, pp. 1-2.
350. Scott MacLeod, "With His Country in Ruins, How Long Can Saddam Hang On?," Time, 11 March 1991, p. 35; Ahtisaari Report.
351. Melissa Healy, "Special Forces: U.S. 'Eyes' Deep in Enemy Territory," Los Angeles Times, 28 February 1991, p. 1.
352. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
353. Rick Atkinson, "Allied Bombs Hit 2 Iraqi Ministries," Washington Post, 13 February 1991, p. A1; "Two Government Departments Hit In Allied Air Strikes on Baghdad," New York Times, 13 February 1991; Dilip Ganguly, "Allies hit Baghdad ministry buildings," Washington Times, 13 February 1991.
354. Joby Warrick, "War's End: Bush claims victory 'for all mankind,'" Air Force Times, 11 March 1991, p. 8.
355. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.
356. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.
357. DOD News Briefing, Lt. Gen. Thomas Kelly, 11 February 1991, 4:05 PM.
358. CENTCOM Briefing, Brig. Gen. Richard I. Neal, 11 February 1991, 10:00 AM.
359. Eric Rosenberg, "F/A-18 Cast As An Aerial Star in Pentagon Post-War Assessment," Defense Week, 18 March 1991; Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991. The Navy flew 18,624 sorties with 22 different types of aircraft; 6,705 were bombing missions, 5,587 were fleet defense and combat air patrols, and 6,322 were support missions.
360. "Moyen-Orient: 43 jours de guerre aeriennne," Air Actualites, No. 441, April 1991, p. 8.
361. Only F-117 stealth fighters, F-111F aircraft, and Tomahawk sea-launched cruise missiles hit targets in Baghdad. Stealth fighters hit approximately 90 percent of the Baghdad targets. Some 1,300 total stealth fighter sorties were flown, less than 60 percent of them against targets in Baghdad. Each sortie delivered a nominal load of two laser-guided bombs. According to Air Force sources, a few hundred F-111 sorties were flown against targets in Baghdad, each also delivering a nominal load of two laser-guided bombs. Some 100-200 Tomahawks were fired against targets in Baghdad.
362. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
363. James Bruce, "Iraq lists '148 aircraft in Iran,'" Jane's Defense Weekly, 27 April 1991, p. 684.
364. John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.
365. Statement of Admiral F.B. Kelso, II, Chief of Naval Operations, before the Subcommittee on Seapower and Strategic and Critical Materials of the House Armed Services Committee, on the FY 92-93 Navy Budget, 24 April 1991.
366. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.

367. Ian Kemp, "100-hour war to free Kuwait," Jane's Defense Weekly, 9 March 1991, p. 326.

368. Denis D. Gray, Associated Press, Pool Report with the 2nd Marine Division, 27 February 1991; Jeff Franks, Reuters, Pool Report with the "US Marines near Kuwait City," 27 February 1991.

369. Douglas Jehl, "Truce Halts Tanks On Brink of Battle," Washington Post, 2 March 1991, p. 1. The commander of the division stated to another pool reporter that his division had destroyed some 630 tanks, and killed 7,000 to 10,000 Iraqis; Paul Majendie, Reuters, Pool Report with the 1st Armored Division, 1 March 1991.

370. Ron Martz, Cox Newspapers, Pool Report with the 24th Infantry Division, 2 March 1991.

371. Hansard (UK House of Commons), 19 March 1991, p. 90.

372. John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.

373. Michael A. Dornheim, "Trapeze Gives F-117 Ability to Carry Variety of Weapons," Aviation Week & Space Technology, 1 April 1991; Bill Sweetman and James C. Goodall, "Enhanced F-117 waits in the wings," Jane's Defense Weekly, 27 April 1991, p. 699.

374. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 3. Individual stealth aircraft averaged 29.7 sorties per month; "TAC Mission Capable Rates Up 7% For War, Even As Sorties Doubled," Aerospace Daily, 2 April 1991, p. 9.

375. Statement of Rear Admiral R.T. Reimann, U.S. Navy, Deputy Assistant Chief of Naval Operations (Surface Warfare), before the House Armed Services Committee, on Fiscal Year 1992-93 Weapons Procurement, Navy, 10 April 1991. Navy and Marine Corps aircraft dropped 20,000 laser-guided and Mk-80 series dumb bombs, and nearly 900 HARM anti-radiation missiles. Naval and Marine Corps aircraft also fired SLAM missiles, Maverick missiles, Rockeye cluster bombs, possibly Shrike and Sidearm missiles, and the Walleye guided bombs. Marine Corps helicopters fired 180 Hellfire missiles, and nearly 300 TOW anti-tank missiles were expended by the Marine Corps.

As of February 15, Navy aircraft carriers had fired more than 1,000 air-to-ground missiles; Randall Richard, "Like Fish In a Barrel, U.S. Pilots Say," Washington Post, 27 February 1991.

The number of Navy weapons fired included 644 HARMs, 4,473 Rockeyes, seven SLAMs, 124 Walleyes, 15,578 Mk-80 series dumb bombs, and 1,079 guided weapons; Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991.

376. "Britain Played Key Role in Allied Success, Retains Lead in Clearing Mines From Gulf," Aviation Week & Space Technology, 11 March 1991, p. 24; "Air war doctrine affirmed," Jane's Defense Weekly, 4 May 1991, p. 738. The Royal Air Force fired over 100 JP233 airfield denial weapons, some 6,000 bombs (including the US CBU-87 cluster bomb), of which over 1,000 were US Paveway laser guided bombs, over 100 ALARM anti-radiation missiles, and 700 CRV7 air-to-ground unguided rockets.

377. The Desert Storm FY 1991 supplemental budget request to Congress reports the following weapons as required to replenish US stocks. This information can be used as a guide to the approximate number of certain weapons expended in the

war; but only includes those weapons requested for replenishment and not necessarily the total number of weapons expended in the war. Excluded are those weapons expended but are no longer in production, or weapons the military did not want to replenish.

The missiles included:

- 2,095 HARM missiles, 1,082 for the Air Force, 731 for the Navy, and 282 for the Marine Corps,

- 217 Walleye missiles, 215 for the Navy, and 2 for the Marine Corps, and

- 8 SLAM missiles for the Navy.

Anti-tank guided missiles and artillery projectiles number at least 5,276, including:

- 4,699 Maverick missiles, 4,666 for the Air Force and 33 for the Marine Corps,

- 565 Hellfire missiles, 241 for the Army and 324 for the Marine Corps, and

- 12 Copperhead laser-guided artillery shells for the Army.

Guided bombs number at least 4,077, including:

- 2,643 GBU-10, 2,597 for the Air Force, and 46 for the Marine Corps,

- 176 GBU-12 for the Marine Corps,

- 62 GBU-15 for the Air Force,

- 446 GBU-24 for the Air Force, and

- 750 GBU-27 for the Air Force.

Cluster bombs and rockets number at least 44,922, including:

- 15,564 CBU-52/58/71 for the Air Force,

- 48 CBU-78 GATOR for the Marine Corps,

- 8,675 CBU-87 for the Air Force,

- 2,396 CBU-89 for the Air Force, and

- 12,051 Mk-20 Rockeyes for the Marine Corps and 6,188 Mk-70 Rockeye IIs for the Air Force.

"Dumb" bombs number at least 136,755, including:

- 70,455 Mk-82, 56,420 for the Air Force, 8,055 for the Navy, and 5,980 for the Marine Corps.

- 13,620 Mk-83, 6,662 for the Navy and 6,958 for the Marine Corps,

- 21,817 Mk-84, 18,299 for the Air Force, 2,645 for the Navy, and 873 for the Marine Corps, and

- 30,863 M117 for the Air Force.

378. Bill Sweetman and James C. Goodall, "Enhanced F-117 waits in the wings," Jane's Defense Weekly, 27 April 1991, p. 699.

379. In his DOD News Briefing (15 March 1991), Gen. McPeak stated that the US used 6,420 tons of smart bombs, but this was a preliminary figure.

The Air Force delivered about 74 percent of the total tonnage and 90 percent of the smart weapons; DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991; Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 6.

British forces dropped 3,000 tons of weapons, but it is unknown at this time the amount of ordnance expended by other allies in the air war; "Britain Played Key Role in Allied Success, Retains Lead in Clearing Mines From Gulf," Aviation Week & Space Technology, 11 March 1991, p. 24. The percentage of smart to dumb weapons is not thought to change with the addition of the ordnance delivered by the allies.

380. Private communications with the authors.

381. Eric Rosenberg, "Navy Touts Its Many Roles and

- Contributions In the Gulf War," Defense Week, 29 April 1991. The battleships fire 1.25 ton shells. On 25 February, the Missouri alone fired 133 rounds or 125 tons of ordnance on targets in Kuwait. Eventually, the Wisconsin and the Missouri fired more than 1,000 rounds of 16-inch ammunition in support of ground operations; the Missouri alone fired more than one million lbs (5,000 tons) of ordnance. During the war, the USS Wisconsin fired her 16-inch guns 324 times during 34 naval gunfire support missions, accounting for some 874,800 lbs (4,400 tons) of high explosives; Department of the Navy, "Navy-Marine Corps Team – Desert Storm 1991," Spring 1991.
382. "Modernization Program Systems Prove Themselves in the Desert," Army, May 1991, p. 14. This number is probably low, as British ground forces fired 2,500 MLRS rockets alone. In addition, 30 ATACMs (Army Tactical Missile System) rockets were fired. A total of some 90 laser-guided Copperhead 155mm artillery projectiles were fired.
383. Department of the Army, Weapons Systems 1991 United States Army, (Washington, DC: 1 March 1991), p. 67.
384. "Britain Played Key Role in Allied Success, Retains Lead in Clearing Mines From Gulf," Aviation Week & Space Technology, 11 March 1991, p. 24.
385. R.W. Apple Jr., "Hueys and Scuds: Vietnam and Gulf Are Wars Apart," New York Times, 23 January 1991, p. 1.
386. R. Jeffrey Smith, "Official Accounts of Battle Leave Many Gaps," Washington Post, 22 January 1991, p. A1.
387. Malcolm W. Browne, "Invention That Shaped the Gulf War: the Laser-Guided Bomb," New York Times, 26 February 1991, p. C1.
388. Julie Bird, "Horner: Further AF role in gulf not needed," Air Force Times, 18 March 1991, p. 8.
389. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
390. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51. The New York Times reported on 10 March that Air Force officials stated that the stealth fighter "hit about 95 percent of its targets in the gulf war...," Eric Schmitt with Michael R. Gordon, "Unforeseen Problems in Air War Forced Allies to Improvise Tactics," New York Times, 10 March 1991, p. A1. Aviation Week reported that the reliability of the GBU-27, delivered exclusively by the F-117, was in excess of 95 percent; David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.
391. Julie Bird, "Horner: Further AF role in gulf not needed," Air Force Times, 18 March 1991, p. 8; Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54.
392. Fred Kaplan, "Laser bombs hit targets 60 percent of time, officials say," Boston Globe, 29 January 1991, p. 1. See also Earl Lane, "Smart Bombs May Be Dumb About 40 Percent of the Time," Philadelphia Inquirer, 11 February 1991, p. 12A.
393. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
394. R. Jeffrey Smith, "Numerous U.S. Bombs Probably Missed Targets," Washington Post, 22 February 1991, p. A1.
395. "Flexibility of Attack Aircraft Crucial To Crushing Iraq's Military Machine," Aviation Week & Space Technology, 22 April 1991, p. 46.
396. John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.
397. John D. Morrocco, "War Will Reshape Doctrine, But Lessons Are Limited," Aviation Week & Space Technology, 22 April 1991, p. 42. RAF Tornados and Jaguars joined US aircraft at higher altitudes as well, particularly after Tornados had sustained high losses in low-altitude airfield attacks. For some time, however, it used a BL755 cluster bomb in the higher altitude attacks but they were not optimized for such attacks, and RAF aircraft switched over to US CBU-87 cluster bombs; "Air war doctrine affirmed," Jane's Defense Weekly, 4 May 1991, p. 738.
398. John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.
399. John D. Morrocco, "Shift in U.S. Military Strategy Calls For Increasing SAC's Conventional Role," Aviation Week & Space Technology, 13 May 1991, p. 27.
400. "Flexibility of Attack Aircraft Crucial To Crushing Iraq's Military Machine," Aviation Week & Space Technology, 22 April 1991, p. 46.
401. "Our planes on alert until cease-fire firm," (Interview), USA Today, 20 March 1991, p. 12.
402. Navy and Marine F-18 aircraft, for instance, were assigned the task of destroying bridges, but after limited results with dumb bombs, the task was reportedly turned over to F-117s armed with smart weapons; "Flexibility of Attack Aircraft Crucial To Crushing Iraq's Military Machine," Aviation Week & Space Technology, 22 April 1991, p. 46.
- A senior Pentagon official told the Los Angeles Times that Air Force pilots were "summoned" after Navy pilots failed to destroy bridges. The official said that it took allied forces 790 sorties to hit 36 "strategic" bridges in the war zone -- "After dozens of misses by the Navy's unguided 'dumb' gravity bombs, the mission was given to Air Force jets that dropped television-guided 'smart' bombs;" Nora Zamichow, "Forgotten' Navy Plays Up Its Exploits," Los Angeles Times, 19 March 1991, p. 7.
- These reports, however, do not necessarily agree with other reports. According to one naval officer, Navy "laser-guided bombs have been especially effective on bridges, power plants and ammunition depots;" CDR Steve Endacott, USN, "Desert Storm Report," Wings of Gold, Spring 1991. Another report stated that Navy F-18s struck bridges with laser-guided bombs; Eric Rosenberg, "F/A-18 Cast As An Aerial Star in Pentagon Post-War Assessment," Defense Week, 18 March 1991.
403. William Drozdiak, "Iraqi Says Regime Made 'Mistakes,'" Washington Post, 8 May 1991, p. A1.
404. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
405. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.
406. James W. Canan, "Airpower Opens the Fight," Air Force Magazine, March 1991, p. 16.
407. Tony Capaccio, "McPeak: Unclear If Air War Has Sapped Iraqi Will," Defense Week, 4 February 1991.
408. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.
409. Rowan Scarborough, Washington Times, Pool Report

Aboard the USS Blue Ridge, 27 February 1991

410. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.
411. Jeffrey M. Lenorovitz, "F-117s Drop Laser-Guided Bombs in Destroying Most Baghdad Targets," Aviation Week & Space Technology, 4 February 1991, p. 30.
412. Tony Capaccio, "McPeak: Unclear If Air War Has Sapped Iraqi Will," Defense Week, 4 February 1991.
413. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
414. Paul McEnroe, "Commandos in Iraq guide allied bombers," Minneapolis Star-Tribune, 21 February 1991, p. 1.
415. Associated Press, "Gossamer Helps Black Out Baghdad," Los Angeles Times, 24 February 1991, p. 8.
416. ABC News "Primetime Live." 24 January 1991.
417. Eric Schmitt with Michael R. Gordon, "Unforeseen Problems in Air War Forced Allies to Improvise Tactics," New York Times, 10 March 1991, p. A1.
418. Remarks by the Honorable Donald B. Rice, Secretary of the Air Force, to the Atlantic CEO Institute 1991 Roundtable, Washington, DC, 16 March 1991.
419. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 7.
420. "Bombing Leaves Baghdadis Scrambling for Necessities," New York Times, 2 February 1991, p. A6.
421. Nora Boustany, "Refugees Describe Air Raid Horrors," Washington Post, 21 January 1991, p. A1. See also "Bombing Leaves Baghdadis Scrambling for Necessities," New York Times, 2 February 1991, p. 6.
422. Erika Munk, "The New Face of Techno-war," The Nation, 6 May 1991, p. 583.
423. Reuters (Najaf, Iraq), "Air Strikes Hit Homes Near Shiite Moslem Shrine," 4 February 1991.
424. On 23 January, the Washington Post reported that the Pentagon was "expected to release some videotaped footage of air strikes that have been less than the pinpoint success aired thus far. One taped sequence shows a raid that targeted a government ministry in Baghdad but demolished a building across the street because the pilot misidentified his target;" Rick Atkinson and Dan Balz, "Missiles Launched At Saudi Arabia Cause No Damage," Washington Post, 23 January 1991, p. A1.
425. Associated Press (Salah Nasrawi), Baghdad, Gulf War, 4 February 1991.
426. R. Jeffrey Smith, "Numerous U.S. Bombs Probably Missed Targets," Washington Post, 22 February 1991, p. A1.
427. Nora Boustany, "Selected Targets Hit On First Day of War," Washington Post, 18 January 1991.
428. Paul Lewis, "Effects of War Begin to Fade In Iraq," New York Times, 12 May 1991, p. 2E.
429. Alan Cowell, "More Air Attacks On Road to Jordan," Washington Post, 1 February 1991; Alan Cowell, "Iraq Suspending Fuel Sales, As Raids Widen Shortages," New York Times, 6 February 1991; Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1.
430. Henry Selz, "Iraq Trip Report: Amman/Baghdad/Karbala/ Baghdad/Amman, 24-28 March, 1991," The American Friends Service Committee, 6 April 1991, p. 1.
431. R.W. Apple Jr., "US Hits Hussein's Town, As War Hits Home in Iraq," New York Times, 6 February 1991, p. A8.
432. See Edward S. Herman, "Smart Bombs and Dumb Bombs," Lies of our Times, March 1991, p. 4; "Allied Bombers Said to Kill 60 Civilians Fleeing by Bus," New York Times, 14 February 1991, p. A20.

In the end, the SCUD missile hunting campaign, which was directed at destroying vehicles and in areas of SCUD activity, including western Iraq, included "a lot of road wrecking," according to Gen. McPeak; DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
433. Associated Press, "Gossamer Helps Black Out Baghdad," Los Angeles Times, 24 February 1991, p. 8.
434. CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-10.
435. Reuters, "CNN Reporter Says Iraqi Residential Area Bombed," 25 January 1991.
436. CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-6.
437. "Iraqis Sever Ties With Six Nations," New York Times, 7 February 1991, p. A1; as reported in Alexander George, "Covering Up Casualties," Lies of our Times, March 1991, p. 3.
438. Nora Boustany, "Iraq Charges High Civilian Toll in Air Raids," Washington Post, 7 February 1991, p. A1.
439. Carol Rosenberg, "Scenes of war's havoc," Philadelphia Inquirer, 10 February 1991, p. 1A.
440. William Branigin, "'Collateral Damage:' View From Ground Zero," Washington Post, 26 March 1991, p. A10.
441. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1.
442. "Allied Bombers Said to Kill 60 Civilians Fleeing by Bus," New York Times, 14 February 1991, p. A20; See also Clyde Haberman, "Jordanians, Returning Home, Talk of Bombs and Hardship," New York Times, 17 February 1991.
443. R. Jeffrey Smith, "Numerous U.S. Bombs Probably Missed Targets," Washington Post, 22 February 1991, p. A1; "Britain Admits a Bombing Error on Bridge," New York Times, 18 February 1991.
444. Lee Hockstader, "Baghdad Residents Face Health Crisis," Washington Post, 4 March 1991, p. A1.
445. Lee Hockstader, "Baghdad Residents Face Health Crisis," Washington Post, 4 March 1991, p. A1.
446. Ahtisaari Report.
447. Ahtisaari Report.
448. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1; Melissa Healy and Mark Fineman, "U.S. Forced to Defend Basic Targeting Goals," Los Angeles Times, 14 February 1991, p. 1; Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
449. For the first time since the air war began, stories going out of Baghdad were not subject to Iraqi censorship. See Robert D. McFadden, "Iraqis Assail U.S. As Rescue Goes On," New York Times, 15 February 1991, p. A1.
450. Paul Lewis, "Effects of War Begin to Fade in Iraq," New York Times, 12 May 1991, p. 2E.
451. R.W. Apple, Jr., "Allies to Review Air Target Plans to Avoid Civilians," New York Times, 15 February 1991, p. A1; Clyde Haberman, "Arabs in Many Nations Protest Bombing," New York Times, 15 February 1991, p. A13; Peter F. Sisler, "Anger in Arab world may alter U.S. tactics," Washington

- Times, 15 February 1991, p. A10; Peter Applebome, "Carnage in Baghdad Erases Image of an Antiseptic War," New York Times, 14 February 1991; Warren Strobel, "U.S. scrutinized after bombing Iraqi civilians," Washington Times, 14 February 1991.
452. R.W. Apple, Jr., "Allies to Review Air Target Plans to Avoid Civilians," New York Times, 15 February 1991, p. A1. See also Patrick E. Tyler, "U.S. Stands Firm on Bomb Attack And Says Investigation is Closed," New York Times, 15 February 1991, p. A1.
453. Patrick E. Tyler, "U.S. Stands Firm on Bomb Attack And Says Investigation is Closed," New York Times, 15 February 1991, p. A1; Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991.
454. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1.
455. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1; R. Jeffrey Smith, "Building Was Targeted Months Ago as Shelter for Leaders," Washington Post, 14 February 1991, p. A25.
456. Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
457. Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
458. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1. See also Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
459. Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
460. Michael R. Gordon, "U.S. Calls Target a Command Center," New York Times, 14 February 1991, p. A17.
461. Rick Atkinson and Dan Balz, "White House Puts Blame on Saddam," Washington Post, 14 February 1991, p. A1.
462. Patrick E. Tyler, "U.S. Stands Firm on Bomb Attack And Says Investigation is Closed," New York Times, 15 February 1991, p. A1.
463. UPI (Washington), "Allies Not Deterred by Iraqis Use of Civilians as Shields," 15 February 1991.
464. Michael Evans, "General reveals secrets of war," (London) Times, 25 March 1991, p. 11.
465. William J. Broad, "How the Iraqi Military Communicates," New York Times, 15 February 1991; Elaine Sciolino, "Is it the Luxury Hotel's Basement, Or an Iraqi Military Nerve Center?," New York Times, 15 February 1991.
466. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
467. John D. Morrocco, "USAF Developed 4,700-Lb. Bomb in Crash Program To Attack Iraqi Military Leaders in Hardened Bunkers," Aviation Week & Space Technology, 6 May 1991, p. 67.
468. William Drozdiak, "Iraqi Says Regime Made 'Mistakes,'" Washington Post, 8 May 1991, p. A1.
469. According to Iraqi officials, a total of 83 road bridges were destroyed in the war; Ahtisaari Report.
470. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
471. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
472. Lee Hokstader, "A Taste of Normalcy in Land of the Midnight Bomb," Washington Post, 3 March 1991.
473. DOD News Briefing, 12 February 1991, 3:30 PM.
474. After the Amiriya bunker bombing, the military leaked that it was giving consideration to hitting two bridges in Baghdad across the Tigris river that carry communications cables; R.W. Apple, Jr., "Allies to Review Air Target Plans to Avoid Civilians," New York Times, 15 February 1991, p. A1.
- Destroying bridges as a means of severing communications doesn't seem to be a very efficient, or necessary method of attack. In addition, there were reports of special operations forces, operating behind enemy lines, physically destroying land lines for communications, questioning the need for a bombardment attack mission; Bill Gertz, "Commandos smashed Iraqi communications lines," Washington Times, 6 March 1991, p. 9.
475. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54.
476. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
477. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51.
478. Throughout the lead-up to the war, and during the air war, various reports identified Iraqi nuclear weapons facilities at al Fallujah, al Qaim, Arbil, Iskandirayah, Mosul, Tadjji, Tuwaitha, and Zafaranya. On 30 January, Gen. Schwarzkopf stated that 31 nuclear, chemical, and biological facilities had been targeted and struck. His briefing chart showed that 18 were chemical related, 10 biological, and three nuclear; CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.
- A uranium purification and fuel fabrication site was also believed to be located at Tuwaitha, and according to the 29 November 1990 Nucleonics Week, Iraq's supply of 20 kg of highly-enriched uranium under IAEA safeguards was also located at Tuwaitha.
- Iraq reportedly operated a gas centrifuge research program at two locations in addition to Tuwaitha -- at Tadjji, nine miles northwest of Baghdad ("Factory 10"); and Mosul, 160 miles north-northwest of Baghdad. Seemingly these "manufacturing/processing" facilities have also been attacked.
- Uranium extraction is reportedly conducted near al Qaim, some 160 miles northwest of Baghdad, on the Syrian border. The facility is reported to be able to extract uranium from phosphate, and possibly to produce uranium hexafluoride from natural uranium (uranium hexafluoride is a feedstock for enrichment). The al Qaqa State Establishment at Iskandariyah about 30 miles south of Baghdad is reportedly developing non-nuclear components of nuclear weapons. Fuel enrichment research laboratories are also reported at al Fallujah and Zafaranya; and uranium mining is reported in the Gara mountains, near Serseng.
479. DOD News Briefing, Gen. Colin Powell, 23 January 1991, 2:00 PM.
- Lt. Gen. Kelly responded to another question on 28 January, when referring to a Washington Post story which said 100 percent of Iraq's nuclear capability had been destroyed that, "I think General Powell said, first of all, that we dealt with the nuclear manufacturing/processing/research facility." (emphasis added)

480. DOD News Briefing, Maj. Gen. Martin L. Brandtner, 24 January 1991, 3:30 PM.

481. CENTCOM Briefing, Gen. Norman Schwarzkopf, 27 January 1991, 12:10 PM.

482. DOD News Briefing, Lt. Gen. Thomas Kelly, 29 January 1991, 3:30 PM.

483. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

484. Thomas W. Lippman, "Iraq May Still Have Nuclear Capability," Washington Post, 22 January 1991, p. A18.

As of 29 January, no unusual radioactivity had been reported from Iraq, according to the IAEA's rapid communications network based in Vienna; International Physicians for the Prevention of Nuclear War, Inc. (Katherine Yih, PhD), "The Possible Health and Environmental Effects of the Bombing of Iraq's Nuclear Reactors," 15 February 1991, p. 3.

485. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991; Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 3.

486. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

487. The only "smart weapons" delivered by F-16s during the war were Maverick anti-tank missiles; they never delivered laser-guided bombs; Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 6-7; "F-16As Prove Usefulness in Attack Role Against Iraqi Targets in Desert Storm," Aviation Week & Space Technology, 22 April 1991, pp. 62-63.

According to Department of the Air Force, "USAF Standard Aircraft/Missile Characteristics," March 1984 (Addendum 58) (partially declassified and released under the FOIA), the F-16 can carry the GBU-8, GBU-10, and GBU-12.

488. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, pp. 51-53.

489. David A. Fulghum, "F-117 Pilots, Generals Tell Congress About Stealth's Value in Gulf War," Aviation Week & Space Technology, 6 May 1991, p. 66.

490. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, pp. 51-53.

491. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, pp. 51-53. The later report in Aviation Week stated that eight, rather than four F-117 stealth fighters were used in the second raid; David A. Fulghum, "F-117 Pilots, Generals Tell Congress About Stealth's Value in Gulf War," Aviation Week & Space Technology, 6 May 1991, p. 66.

492. In November, the IAEA certified that the 12.3 kilograms of HEU was stored at Tuwaitha.

493. International Physicians for the Prevention of Nuclear War, Inc. (Katherine Yih, PhD), "The Possible Health and Environmental Effects of the Bombing of Iraq's Nuclear Reactors," 15 February 1991, p. 5.

494. CENTCOM Briefing, Gen. Norman Schwarzkopf, 30 January 1991.

495. DOD News Briefing, Lt. Gen. Thomas Kelly, 11 February 1991, 4:05 PM.

496. Washington Post, 16 December 1990; as cited in News

Chronology compiled by Julian Perry Robinson, as published in Chemical Weapons Convention Bulletin, March 1991, p. 5.

497. Tim Collie, "U.S. officers certain they'll face chemical weapons," The Baltimore Sun, 22 February 1991, p. 8.

498. Edith M. Lederer, "Despite the fears, Iraq never used its chemical arms," Philadelphia Inquirer, 1 March 1991, p. 13.

499. CENTCOM Briefing, Brig. Gen. Richard I. Neal, 11 February 1991, 10:00 AM.

500. David A. Fulghum, "F-117 Pilots, Generals Tell Congress About Stealth's Value in Gulf War," Aviation Week & Space Technology, 6 May 1991, p. 66.

501. Edith M. Lederer, "Despite the fears, Iraq never used its chemical arms," Philadelphia Inquirer, 1 March 1991, p. 13; Robert Fox, "Mounds of dead 'just one of those things,'" Washington Times, 5 March 1991.

One Washington Times report stated that a Republican Guard artillery brigade was "spotted cleaning up an apparent chemical weapons spill in an area north of Kuwait," and that "Iraqi forces either mishandled the deadly arms or were decontaminating the area after allied bomb strikes hit chemical arms stocks;" Bill Gertz, "Iraqis clean up apparent chemical spill," Washington Times, 5 March 1991.

502. Robert Ruby, "Evidence indicates Iraqis in the battlefield did not have chemical weapons," Baltimore Sun, 5 March 1991, p. 4; Rick Atkinson, "No Chemical Arms Found on Battlefields," Washington Post, 7 March 1991, p. 1.

503. Edith M. Lederer, "Despite the fears, Iraq never used its chemical arms," Philadelphia Inquirer, 1 March 1991, p. 13; Eric Schmitt, "Why Iraqi Battle Threat Fizzled: Allied Strengths and Enemy Weaknesses," New York Times, 4 March 1991, p. 9; Rick Atkinson, "No Chemical Arms Found on Battlefields," Washington Post, 7 March 1991, p. 1.

504. News Chronology compiled by Julian Perry Robinson, as published in Chemical Weapons Convention Bulletin, March 1991, p. 12.

505. Washington Times, 22 January 1991.

506. "Iraqi Ship Destruction, Toxic Cloud Noted," Paris Domestic Service in French, 3 February 1991; and "Nerve Gas Said Detected After Bombing in Iraq," Paris AFP, 3 February 1991; in FBIS-Western Europe, FBIS-WEU-91-023, 4 February 1991, pp. 26-27.

507. CENTCOM Briefing, Maj. Gen. Robert Johnston, 4 February 1991.

508. CENTCOM Briefing, Brig. Gen. Richard I. Neal, 11 February 1991, 10:00 AM.

509. UPI (United Nations), "Iraq calls for UN probe on military factory," 8 February 1991. On the same day as the attack, refugees in Jordan reported that a powdered milk processing plant was destroyed in the Akartouf district of Baghdad; Nora Boustany, "Refugees Tell of Residential Bombing," Washington Post, 23 January 1991, p. A1.

510. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

511. CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.

512. Village Voice, 5 February 1991, p. 8; as reported in Ellen Ray and William H. Schaap, "Minefields of Disinformation," Lies of Our Times, March 1991, p. 7.

513. AP (Washington), "Gulf-Bombed Factory," 8 February 1991; see also Al Kamen, "Accounts Differ on Role of Bombed Iraqi Factory; Contractor: Plant Built to Make Baby Food,"

Washington Post, 8 February 1991.

A New Zealand contractor, who was working on construction of a cheese production plant in Iraq before the war, stated that a pharmaceutical plant was located within the same complex as the infant formula plant, and must be "a likelier place for biological weapons production."

514. Al Kamen, "Accounts Differ on Role of Bombed Iraqi Factory; Contractor: Plant Built to Make Baby Food," Washington Post, 8 February 1991.

515. "Our planes on alert until cease-fire firm," (Interview), USA Today, 20 March 1991, p. 12.

516. Michael Evans, "General reveals secrets of war," Times (London), 25 March 1991, p. 11.

517. Lee Hockstader, "A Taste of Normalcy in Land of the Midnight Bomb," Washington Post, 3 March 1991.

518. "Saddam has a real problem," USA Today, 25 March 1991, p. 7.

519. Two writers at the US Army War College questioned Iraqi use of chemical weapons against the Kurdish population in their book Iraqi Power and US Security in the Middle East. They further explained their thinking in the 22 November issue of the New York Review of Books:

Essentially there are two instances under scrutiny. The first attack allegedly occurred at Halabjah in north-central Iraq. All accounts of this incident agree that the victims' mouths and extremities were blue. This is consonant with the use of a blood agent. Iraq never used blood agents throughout the war. Iran did. The US State Department said at the time of the Halabjah attack that both Iran and Iraq had used gas in this instance. Hence, we concluded it was the Iranians' gas that killed the Kurds.

The second alleged gas attack by the Iraqis against the Kurds occurred at Amadiyyah (in the far northern part of Iraq) after the war had ended. This one is extremely problematical since no gassing victims were ever produced. The only evidence that gas was used is the eye-witness testimony of the Kurds who fled to Turkey, collected by staffers of the US Senate. We showed this testimony to experts in the military who told us it was worthless.

See News Chronology compiled by Julian Perry Robinson, as published in Chemical Weapons Convention Bulletin, March 1991, p. 5.

520. News Chronology compiled by Julian Perry Robinson, as published in Chemical Weapons Convention Bulletin, March 1991, p. 6.

521. Press Conference, Secretary of Defense Cheney, Chairman of the Joint Chiefs of Staff General Colin Powell, 23 December 1990.

522. Charts shown at CENTCOM Briefing by Gen. Norman Schwarzkopf, 30 January 1991.

523. Bob Dvorchak, Associated Press, Pool Report "in southern Iraq," 27 February 1991.

524. Bob Woodward, "Key Iraqi Assets Said to Survive 10-Day Air War," Washington Post, 28 January 1991, p. 1.

525. Breck W. Henderson, "Desert Storm Success Pushes Military To Build Advanced High-Tech Systems," Aviation Week & Space Technology, 18 March 1991, p. 169. See also David A. Fulghum, "U.S. Searches for Electronic Equipment Used by Iraqis to Foil Allied Attacks," Aviation Week & Space Technology, 18 March 1991, p. 27

526. DOD News Briefing, Pete Williams, 11 February 1991, 4:05 PM.

527. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

528. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

529. R.W. Apple, Jr., "Raids Said to Badly Delay Baghdad Messages to Front," New York Times, 11 February 1991, p. A12.

530. R. Jeffrey Smith, "Air War Wrecked Iraqi Ability to Detect and React to Allies," Washington Post, 27 February 1991, p. 28.

531. Jeffrey M. Lenorovitz, "Allies Fly Defensive Missions After Air War Smashes Iraq," Aviation Week & Space Technology, 11 March 1991, p. 18.

532. S. Lynn Walker, San Diego Union, Pool Report in northern Kuwait, 28 February 1991.

533. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.

534. "Marines Attribute Success To Conventional Bombing," Aviation Week & Space Technology, 22 April 1991, p. 92.

535. Bill Gannon, Newark Star-Ledger, Pool Report "with the Tiger Brigade in Occupied Kuwait," 27 February 1991.

536. Mike Gaines, "Land offensive results in rapid collapse of Iraqi ground forces," Flight International, 6-12 March 1991, p. 8.

537. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.

538. Michael Kelly, "Highway to Hell," The New Republic, 1 April 1991, p. 12.

539. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.

540. Bill Gannon, Newark Star-Ledger, Pool Report "with the Tiger Brigade Outside Kuwait City," 26 February 1991.

541. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.

542. Donatella Lorch, "7 Miles of Carnage Mark Road Iraqis Used to Flee," New York Times, 3 March 1991, p. 17.

543. Paul Greenberg, "Along the highway to hell," Washington Times, 12 March 1991.

544. Donatella Lorch, "7 Miles of Carnage Mark Road Iraqis Used to Flee," New York Times, 3 March 1991, p. 17.

545. "Move Forward and Shoot the Things," Newsweek, 11 March 1991, p. 25.

546. Michael Kelly, "Highway to Hell," The New Republic, 1 April 1991, p. 12.

547. Mike Gaines, "Land offensive results in rapid collapse of Iraqi ground forces," Flight International, 6-12 March 1991, p. 8.

548. John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66. See also Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.

549. Randall Richard, "Like Fish In a Barrel, U.S. Pilots Say," Washington Post, 27 February 1991.

550. Marc Zolton, "Carrier air stung Saddam with 16,000 sorties," Navy Times, 11 March 1991, p. 16.

551. Rowan Scarborough, Washington Times, Pool Report

aboard the USS Blue Ridge, 27 February 1991.

552. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
553. Randall Richard, "'Like Fish In a Barrel,' U.S. Pilots Say," Washington Post, 27 February 1991.
554. Randall Richard, "'Like Fish In a Barrel,' U.S. Pilots Say," Washington Post, 27 February 1991.
555. Randall Richard, "'Like Fish In a Barrel,' U.S. Pilots Say," Washington Post, 27 February 1991.
556. Michael Kelly, "Highway to Hell," The New Republic, 1 April 1991, p. 12.
557. "Iraqi corpses, ruin of army fill highway of the macabre," Washington Times, 12 March 1991.
558. Jim Hoagland, "Iraq's Shame, Iraq's Future," Washington Post, 5 March 1991, p. A21.
559. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
560. DOD News Briefing, General "Tony" McPeak, USAF, 15 March 1991.
561. "Our planes on alert until cease-fire firm," (Interview), USA Today, 20 March 1991, p. 12.
562. Thomas Ferrard, UPI, Pool Report with Army's 24th Division, Eastern Iraq, 2 March 1991.
563. Rick Atkinson, "Outflanking Iraq: Go West, 'Go Deep,'" Washington Post, 18 March 1991, p. 1.
564. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.
565. Rick Atkinson, "Outflanking Iraq: Go West, 'Go Deep,'" Washington Post, 18 March 1991, p. 1.
566. Rick Atkinson, "Outflanking Iraq: Go West, 'Go Deep,'" Washington Post, 18 March 1991, p. 1.
567. Rick Atkinson, "Outflanking Iraq: Go West, 'Go Deep,'" Washington Post, 18 March 1991, p. 1.
568. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.
569. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.
570. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.
571. Rick Atkinson and William Claiborne, "Allies Surround Republican Guard, Say Crippled Iraqis Are Near Defeat," Washington Post, 27 February 1991, p. A1.
572. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.
573. Thomas Ferrard, UPI, Pool Report with the Army's 24th Division, Eastern Iraq, 2 March 1991.

#### The Laws of Armed Conflict and Protection of the Environment

574. Roberts and Guelff point out that "Despite the importance of international agreements in the contemporary development of the law, any work concerning the laws of war which is limited to international agreements runs the risk of distorting not only the form but also the substance of the law....the present laws of war emerged as customary rules from the practice of states....During the very process of codification it was recognized that much of the law continued to exist in the form of unwritten customary principles;" Adam Roberts and Richard Guelff, Documents on the Laws of War, Second Edition (Oxford: Clarendon Press, 1989), p. 4.

The sources of law include treaties and conventions, known as "conventional international law;" the practice of states, known as "customary international law;" as well as the legal opinions of international courts, known as *opinio juris*.

575. On 19 January, the US State Department announced the transfer of diplomatic notes with Iraq reaffirming the US intention to abide by its legal obligations under the 1940 Geneva Convention relative to the protection of POWs. It also stated that it expected Iraq to reciprocate. A second note affirmed legal protection from attack on US military hospital ships in the area.

576. Remarks of Lt. Col. Burrus Carnahan, The American University Journal of International Law and Policy, Vol. 2, 1987, p. 508.

577. Department of the Air Force, "International Law -- The Conduct of Armed Conflict and Air Operations," AFP 110-31, 19 November 1976, p. 1-15 (hereafter AFP 110-31).

578. The various principles are:

- humanity and chivalry,
- lawful and unlawful combatants,
- the basic immunity of noncombatants,
- distinction (or discrimination) and proportionality,
- the rule against unnecessary suffering,
- the prohibition of treachery,
- the concept of the military objective, and
- necessity, also called military necessity.

AFP 110-31, p. 1-13, footnote 2.

579. Remarks of Lt. Col. Burrus Carnahan, The American University Journal of International Law and Policy, Vol. 2, 1987, p. 503.

580. Adam Roberts and Richard Guelff, Documents on the Laws of War, Second Edition (Oxford: Clarendon Press, 1989), p. 4.

581. AFP 110-31, pp. 1-5 to 1-6. The US Navy uses a similar summary, and gives the same three principles of military necessity, humanity, and chivalry:

1. Only that degree and kind of force, not otherwise prohibited by the law of armed conflict, required for the partial or complete submission of the enemy with a minimum expenditure of time, life, and physical resources may be applied.

2. The employment of any kind or degree of force not required for the purpose of the partial or complete submission of the enemy with a minimum expenditure of time, life, and physical resources is prohibited.

3. Dishonorable (treacherous) means, dishonorable expedients, and dishonorable conduct during armed conflict are forbidden.

See Department of the Navy, "Annotated Supplement to the Commander's Handbook on the Law of Naval Operations," NWP 9 (Rev. A), 1989, p. 5-4. (hereafter NWP 9 Supplement).

582. Adam Roberts and Richard Guelff, Documents on the Laws of War, Second Edition (Oxford: Clarendon Press, 1989), pp. 5-6.

583. NWP 9 Supplement, p. 11-2.

584. AFP 110-31, p. 5-9.

585. Department of the Navy, "Law of Naval Warfare," NWIP 10-2, 1955 (updated 1974), pp. 3-5, 6-4, and 6-5.

586. See Remarks of Professor Hamilton DeSaussure on Protocol I of the Geneva Convention, The American University Journal of International Law and Policy, Vol. 2, 1987, p. 511; and AFP 110-31, p. 5-3.



587. AFP 110-31, p. 5-16.

588. NWP 9 Supplement, p. 8-3. The US considers this as a statement of customary international law.

589. Humanitarian Law Conference, American University Journal of International Law and Policy, 1987, Vol. 2, p. 515.  
590. Remarks of Professor Hamilton DeSaussure on Protocol 1 of the Geneva Convention, American University Journal of International Law and Policy, Vol. 2, 1987, p. 513.

In considering just targets for bombardment the argument is made that legitimate objectives will and should change with the scale of the conflict. Professor DeSaussure would like to see more examples of objectives proportional to the conflict in military manuals. This approach represents an attempt to give some real application to the largely subjective principles of proportionality and necessity.

591. R.W. Apple Jr., "Allies Study New Steps to Avoid Civilians in Bombing," New York Times, 15 February 1991, p. A1.

592. Two days later, Gen. Powell seemed to state the objective as much narrower, when he said at a press conference that "the military operational objective that we set out to accomplish...is simply to eject the Iraqi Army from Kuwait. All of our activities must ultimately support this fundamental military objective." News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

593. Julie Bird, "Horner: Further AF role in gulf not needed," Air Force Times, 18 March 1991, p. 8.

594. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

595. News Briefing, Secretary of Defense Dick Cheney, General Colin Powell, Chairman, JCS, Wednesday, 23 January 1991.

596. Julie Bird, "Horner: Further AF role in gulf not needed," Air Force Times, 18 March 1991, p. 8.

597. See NWP 9 Supplement, p. 6-14.

598. NWP 9 Supplement, pp. 8.2-8.3.

599. Executive Office of the President, Executive Order No. 11850, "Renunciation of Certain Uses in War of Chemical Herbicides and Riot Control Agents," 8 April 1975.

600. The Inhumane Weapons Convention of 1980 prohibits the use of weapons producing fragments too small to be detected by x-rays, and under certain conditions the use of incendiary weapons, mines, and booby traps against civilians. The US signed the Inhumane Weapons Convention but has made no decision on ratification. The US inserted the reservation that it supports more effective compliance procedures suggested by other countries (similar to remarks filed by France and Italy), procedures it will require before ratification; NWP 9 Supplement, p. 5-18. France subsequently ratified the convention in 1988.

601. For example, in Geneva Protocol I, Article 54, Paragraph 2, dealing with the protection of facilities that could release dangerous forces, protection ceases under the convention if those facilities are used in "regular, significant and direct support" of military operations. Article 54, Paragraph 3, prohibits rendering useless objects essential to the survival of the civilian population, but does not apply if those facilities are used "if not [for the] sustenance [of military forces] then in direct support of military action."

602. Richard A. Falk, "Environmental disruption by military

means and international law," in Arthur H. Westing, ed., Environmental Warfare: A Technical, Legal & Policy Appraisal (London: Taylor & Francis, 1984).

603. The US government has not submitted Geneva Protocol I for ratification, even though it was signed during the Carter Presidency. The JCS did advise ratifying the second Protocol, on intrastate conflict, but primarily according to the responsible JCS staff officer at the time, Lt. Col. Burrus Carnahan, "because we couldn't think of any possible way it would apply to us" (unless perhaps, the US aids a government against an insurgency); Remarks of Lt. Col. Burrus Carnahan, JCS, On the Geneva Protocols, American University Journal of International Law and Policy, Vol. 2, 1987, p. 486.

604. When the US signed Protocol 1, it filed a reservation "...that the rules established by this Protocol were not intended to have any effect on and do not regulate or prohibit the use of nuclear weapons." This reservation was filed primarily because of the new rule on the protection of the natural environment, which would seem to exclude the legal use of nuclear weapons; See George H. Aldrich, "New Life for the Laws of War," American Journal of International Law, Vol. 75, 1981; George H. Aldrich, "Progressive Development of the Laws of War: A Reply to Criticisms of the 1977 Geneva Protocol," Virginia Journal of International Law, Vol. 26, 1986, p. 719; France and the UK made similar statements during the negotiation. It should be noted therefore, that a political impediment to development of stronger international law to protect the environment from warfare is the existence of nuclear weapons themselves.

605. Remarks of Michael J. Matheson, Deputy Legal Advisor, United States Department of State, "United States Position on the Relation of Customary International Law to the 1977 Protocols Additional to the 1949 Geneva Conventions," American University Journal of International Law and Policy, Vol. 2, 1987, p. 425.

606. Jonathan Roberts, "The New Rules for Waging War: The Case against Ratification of Additional Protocol I," Virginia Journal of International Law, Vol. 109, 1985.

607. George H. Aldrich, "Progressive Development of the Laws of War: A reply to Criticisms of the 1977 Geneva Protocol I," Virginia Journal of International Law, Vol. 26, 1986, p. 711.

608. Michael Bothe, Kevin Partsch, and William Solf, New Rules for Victims of Armed Conflicts, 1982.

609. Matheson, *Ibid.*, p. 427.

610. Judge Abraham D. Sofaer, Legal Advisor, Department of State, "The Position of the United States on Current Law of War Agreements," American University Journal of International Law and Policy, Vol. 2, 1987, pp. 467-8; According to NWP-9 Supplement, "Additional Protocol 1, Article 56, would create new law to prohibit, except in very limited circumstances, attacks on this limited class of objects even if the attack was proportional."

611. NWP-9 Supplement, Annex AS6-3, Checklist for compliance with law of war requirements of operation plans and concept plans using the joint operation planning system (JOPS) format, p. 10. (hereafter Annex AS6-3). For example, under a section "Environmental Services" the checklist talks about disposition of captured munitions being "consistent with environmental restrictions" but without saying what these restrictions are; p. 29.

612. NWP 9 Supplement, p. 8-4.

613. George H. Aldrich, "New Life for the Laws of War" The American Journal of International Law, Vol 75, 1981, p.780; "Proposals to add other items to the list [of prohibited objects of attack under Article 54] such as communication systems for food distribution and fuel reservoirs were rejected by the conference, as such items are often, if not always, important military objectives." George H. Aldrich, "Progressive Development of the Laws of War: A Reply to Criticisms of the 1977 Geneva Protocol I" Virginia Journal of International Law, Vol 26, 1986, "Of course we knew about power grids and of course we were not going to agree to a provision that prohibited attacks on key elements of power grids."
614. The Geneva Protocols I and II do not specify chemical plants or biological agent facilities as installations containing dangerous forces. The list, however, is not exhaustive, and numerous facilities attacked by the coalition might come under its terms. In addition, there are numerous precedents for the ability of petrochemical and chemical facilities to cause pollution and injury both to the natural environment and to humans. See Jiri Matousek, "The Release in War of Dangerous Forces from Chemical facilities," in Arthur H. Westing, ed., Environmental Hazards of War: Releasing Dangerous Forces in an Industrialized World (London: PRIO/UNEP, 1989), pp. 30-38.
615. AFP 110-31, pp. 5-9 to 5-11. In the DOD "Checklist" for operational planning the question is asked, "Are facilities and sites such as nuclear plants, chemical plants and dams, damage to which might be dangerous to the populace, identified?" NWP-9 Supplement, Annex AS6-3, p. 8.
616. See George H. Aldrich, "Progressive Development of the Laws of War: A Reply to Criticisms of the 1977 Geneva Protocol I," Virginia Journal of International Law, Vol. 26, 1986, p. 706; and Remarks of Judge Abraham D. Sofaer, Legal Adviser, United States Department of State, "The Position of the United States on Current Law of War Agreements," The American University Journal of International Law and Policy, Vol. 2, 1984, p. 469.
617. Remarks of Michael J. Matheson, Deputy Legal Advisor, United States Department of State, Section I, United States Position on the Relation of Customary International law to the 1977 Protocols additional to the 1949 Geneva Conventions, The American University Journal of International Law and Policy, Vol. 2, 1987, p. 434.
618. Letter from Dr. David Lowry, Director European Proliferation Information Center (London), to the Guardian (UK), 4 February 1991.
619. The US destroyed facilities where it believed Iraq's highly enriched uranium was present. This material was safeguarded by the IAEA, and thus designated for peaceful purposes, regardless of what other suspicions or evidence may have existed as to an Iraqi nuclear weapons program.
620. R. Jeffrey Smith, "B-52s Begin Bombing Elite Units," Washington Post, 23 January 1991, p. 1; Michael R. Gordon, "Bases Used in Spain," New York Times, 1 February 1991, p. 1. As the number of bombers was increased, Britain allowed the basing of bombers on its soil to shorten the distance to the Middle East, rather than flying from the United States. A number of countries participated by providing overflight and refueling assistance, including France and Turkey.
621. B-52s flew 1,624 missions, dropping 72,000 weapons (44 weapons average per mission), and delivering 25,700 tons of munitions. See statement of General Lee Butler, CINCSAC, to the House Armed Services Committee, 20 March 1991, p. 11; Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 5. The eight B-52s flying from the UK flew 60 sorties and dropped 1,158 tons of bombs; Jane's Defense Weekly, 16 March 1991, p. 367.
622. B-52s also delivered smart weapons, specifically the new "Have Nap" (AGM-142A) bunker busting smart missile; R. Jeffrey Smith, "B-52s Begin Bombing Elite Units," Washington Post, 23 January 1991, p. 1; John Boatman, et al, "More B-52s join 'Desert Storm,'" Jane's Defense Weekly, 16 February 1991, p. 206.
623. CENTCOM Media Briefing, 17 January 1991.
624. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 5.
625. Andy Paztor and James M. Perry, "As the Gulf War Begins Its March Into History, Analysts Praise Success but Study the Failures," Wall Street Journal, 6 March 1991, p. 10.
626. R. Jeffrey Smith, "B-52s Begin Bombing Elite Units," Washington Post, 23 January 1991, p. 1.
627. Jeffrey M. Lenorovitz, "Allies Fly Defensive Missions After Air War Smashes Iraq," Aviation Week & Space Technology, 11 March 1991, p. 18.
628. Statement of General Lee Butler, CINCSAC, to the House Armed Services Committee, 20 March 1991, p. 11.
629. R. Jeffrey Smith, "B-52s Begin Bombing Elite Units," Washington Post, 23 January 1991, p. 1.
630. Tony Capaccio, "McPeak: Unclear If Air War Has Sapped Iraqi Will," Defense Week, 4 February 1991.
631. Jeffrey M. Lenorovitz, "Allies Fly Defensive Missions After Air War Smashes Iraq," Aviation Week & Space Technology, 11 March 1991, p. 18.
632. Eric Schmitt with Michael R. Gordon, "Unforeseen Problems in Air War Forced Allies to Improvise Tactics," New York Times, 10 March 1991, p. A1.
633. Joseph B. Treaster, "Giant B-52 Grows Old Virulently," New York Times, 22 January 1991.
634. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 5.
635. "Soviet Peace Pan Weighed As Gulf Ground War Looms," Aviation Week & Space Technology, 25 February 1991, p. 20.
636. Jeffrey M. Lenorovitz, "Allies Fly Defensive Missions After Air War Smashes Iraq," Aviation Week & Space Technology, 11 March 1991, p. 18.
637. Middle East Watch, "The bombing of Iraqi cities: Middle East Watch Condemns Bombing Without Warning of Air Raid Shelter in Baghdad Al Amiriya District on February 13, 1991;" New York, 6 March 1991. Under Article 62, the protection of civilian shelters cease if "they commit or are used to commit, outside of the proper tasks, acts harmful to the enemy." However, Article 65 provides that a warning must be given prior to the removal of such a facility from its protected status: "Protection, may, however cease only after a warning has been given setting, whenever appropriate, a reasonable time limit, and after such warning has remained unheeded."
638. AFP 110-31, p. 5-10. A similar formulation is found in Geneva Protocol I, Article 57.
639. Hamilton DeSaussure, Commentator, American University Law Review, Vol. 31, 1982, p. 888. On the lack of warning against Vietnam in the December 1972 bombing of Hanoi and Haiphong areas, DeSaussure says that, "Although notification nullifies the element of surprise, surprise is

irrelevant when the enemy's air defenses are already mobilized. Moreover, the duration of the Hanoi raids reduced the value of surprise."

640. Brig. Gen. Neal stated on 13 February that, "As to air raid shelters, my understanding is that [the Iraqis] do have air raid shelters. In fact, this was an air raid shelter in 1985, but then was upgraded..to a hardened shelter for command and control."

641. "Design Convinced U.S. Analysts Building was a bunker," Washington Post, 14 February 1991.

642. AFP 110-31, p. 5-11.

643. "Bombers give fair warning," Washington Times, 19 February 1991.

644. Hamilton DeSaussure, Commentator, American University Law Review, Vol. 31, 1982, p. 888. In the Second World War, the allied used warnings extensively before bombing targets in occupied countries; and prior to attacks on North Korean cities. The US, however, did not forewarn the Vietnamese people before its Christmas bombing of Haiphong or Hanoi in 1972. The customary rule on advance warning for bombardment, was applied to air warfare in 1923 by the tribunal set up to examine the case of the German Zeppelin balloon raid on the Greek city of Salonika during the First World War. The tribunal ruled that advance warning was required.

645. William Drozdiak, "Iraqi Says Regime Made 'Mistakes,'" Washington Post, 8 May 1991, p. A1.

646. This does, however, raise a further issue about "just" conduct. It is not clear whether the scale of destruction wrought on the Iraqi column was appropriate, or proportionate. It should be noted that UN peacekeeping forces could have equally responded with fire in self defense, but would not have been able to carry out the same scale of retaliation as US forces. US forces, while not UN peacekeeping forces, took the opportunity to destroy further Iraqi equipment.

647. See, Anthony Lake, ed., After the Wars (Washington, DC: Overseas Development Council, 1990), US Third World Policy Perspectives, No. 16.

648. Rick Atkinson, "Doing a Bang-up Job," Washington Post, 26 March 1991.

649. Ken Ringle, "After the Battles, Defusing the Debris," Washington Post, 1 March 1991, p. B1.

650. Douglas Jehl, Los Angeles Times, Pool Report with the 1st Armored Division, 25 February 1991.

651. William Branigan, "Gruesome Examples of Horrors of War Abound in Iraqi Desert," Washington Post, 3 March 1991, p. A34.

652. William Branigan, "Gruesome Examples of Horrors of War Abound in Iraqi Desert," Washington Post, 3 March 1991, p. A34; Rick Atkinson, "Doing a Bang-up Job," Washington Post, 26 March 1991.

653. Ken Ringle, "After the Battles, Defusing the Debris," Washington Post, 1 March 1991, p. B1.

654. Nora Boustany, "Border Town Becomes Wasteland of Refugees," Washington Post, 20 March 1991, p. A1; Susan Okie, "30,000 Fleeing War Get Shelter in Iran, U.N. Officials Say," Washington Post, 20 March 1991, p. A14.

655. Rick Atkinson, "Doing a Bang-up Job," Washington Post, 26 March 1991.

656. Eric Schmitt, "Gulf is Swept for Mines In the Aftermath of War," New York Times, 19 March 1991, p. 14.

657. Douglas Jehl, "Deep in Iraq, Perils Temper GIs' Jubilation," Los Angeles Times, 5 March 1991, p. 1.

658. Amnesty International reported that, "Those violations which have been reported since 2 August are entirely consistent with abuses known to have been committed in Iraq over many years, and which have been documented...;" Amnesty International, Iraq/Occupied Kuwait Human Rights Violations Since August 2, 1990, December 1990, p. 4.

659. Amnesty International, Iraq/Occupied Kuwait Human Rights Violations Since August 2, 1990, December 1990, p. 10.

660. Amnesty International, Iraq/Occupied Kuwait Human Rights Violations Since August 2, 1990, December 1990, p. 20.

661. Caryle Murphy, "Kuwaiti Pilots, Civilians Exult Over Air Attack," Washington Post, 18 January 1991.

662. United Nations Security Council, Report to the Secretary-General on humanitarian needs in Kuwait...led by Mr. Martti Ahtisaari..., 28 March 1991, p. 13.

663. CRS, American Law Division, Memorandum, "International Law Applicable to Iraq's Invasion and Occupation of Kuwait and to subsequent Response by the International Community," 3 December 1990.

664. Soon after the occupation, Iraq was already using this approach. On 19 August 1990, Iraq ordered all westerners in Kuwait to gather at three hotels and announced a plan to use these people as "human shields" at military and civilians sites. Thirty-five Americans were taken to munitions and chemical-producing sites; CRS, "Iraq-Kuwait Crisis: A Chronology of Events July 17, 1990-February 7, 1991," 8 February 1991, p. 42.

665. On 29 January, during the battle of al Khafji, an Iraqi battalion crossed the border, "with turned turrets -- the international sign of surrender -- then, attacked;" Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.

666. CRS, "Iraq-Kuwait Crisis: A Chronology of Events," Report No. 91-14F, 8 February 1991, p. CRS-7-CRS-8.

667. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

668. Caryle Murphy, "Kuwaitis Resisted, Survived," Washington Post, 4 March 1991, p. A1.

669. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

670. Dan Balz and Edward Cody, "Third of Force In Kuwait Said To Be Depleted," Washington Post, 15 February 1991.

671. Rick Atkinson and Dan Balz, "Bomb Strike Kills Scores of Civilians in Building Called Military Bunker by U.S., Shelter by Iraq," Washington Post, 14 February 1991, p. A1.

672. Rowan Scarborough, "Ground attacks flush Iraqi units," Washington Times, 26 February 1991.

673. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

674. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

675. Aviation Week & Space Technology reported that "U.S. military officials have acknowledged additional oil flowed into the gulf from coalition bomb damage but estimates 70% of the pollution is due to Iraq's deliberate dumping;" "Satellite Image Reveals Oil Dumped in Gulf by Iraq," Aviation Week & Space Technology, 4 March 1991, p. 24; see also David C. Morrison, "War on the Environment," National Journal, 2 March 1991, p.

536. According to Saudi officials, up to one-third of the oil spilled came from bombing attacks by allied aircraft; D'Arcy Jenish, "War's Dark Tide: Canada helps to fight the Gulf oil

spills," Maclean's, 4 March 1991. On 28 January, Baghdad radio reported that US bombing of the refinery at al-Nida (the Iraqi name for the Kuwaiti port of Mina al Ahmadi) caused an oil spill.

On 23 January, US Navy A-6 aircraft disabled an Al Qaddisiyah-class Iraqi tanker moored in the Northern Persian Gulf, setting off three secondary explosions which disabled the ship. The ship was involved in the refueling of a Winchester-class hovercraft at the time. A US military spokesman in Riyadh said on 24 January that the, "The attack was conducted with weapons designed to negate the ship's command and control capability without rupturing the hull. Damage assessment verified that the tanker had been damaged and disabled with fires evidenced on deck." Later in the briefing, he said, "The last report I had was that the tanker has refined oil products on board, which burns very rapidly. It was burning, fires on deck, and there was a spill of approximately one-half mile."

As for the US attack, Gen. Schwarzkopf stated on 27 January that "Because it was refined product, you have an entirely different kind of spill, and they said it wasn't much of a spill. There was a lot of burning, of course, but not a lot of spilling," CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991.

Another source of oil pollution caused in the Gulf war was an accident by the oiler USNS Andrew J. Higgins (T-AO 190) on 2 January, when it ran aground on an uncharted reef off Oman, causing a hull rupture and the leak of an undetermined amount of mixed fuels.

676. DOD News Briefing, 12 February 1991, 3:30 PM.

677. "Iraqis raze Kuwaiti buildings," Washington Times, 25 February 1991, p. 9.

678. Bruce Wallace, "Joy Among the Ruins," MacLean's (Canada), 11 March 1991, p. 24.

679. Bruce Wallace, "Joy Among the Ruins," MacLean's (Canada), 11 March 1991, p. 24.

680. Caryle Murphy, "Kuwaitis Resisted, Survived," Washington Post, 4 March 1991, p. A1.

681. Foreign Policy Bulletin, January-April 1991, Vol. 1, No. 4&5, p. 141.

682. Foreign Policy Bulletin, January-April 1991, Vol. 1, No. 4&5, p. 64.

683. Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1.

684. Under Geneva Convention IV, though, a belligerent can destroy property when "rendered absolutely necessary by military operations." Falk points out that with the allowance for the excuse of military necessity, the legal prohibition is against "wanton" or "superfluous" destruction, and consequently regulatory effects are at best modest; Richard A. Falk, "Environmental disruption by military means and International Law," in Arthur H. Westing, ed., Environmental Warfare: A Technical, Legal and Policy Appraisal (London: Taylor and Francis, 1984), p. 37.

At the Nuremburg trials, ten German civilian administrators were tried for the "ruthless exploitation of Polish forestry" under the customary rule against "pillage" of occupied territory. The case recognized the requirement to "preserve the timber resources of the country," that is, to preserve the natural resource base during occupation.

685. For a discussion of the emerging international law of the environment, see The American University Journal of

International Law and Policy, Vol. 5, No. 2, Winter 1990.

686. Under the Protocol, a military force may destroy on its national territory the works and installations that contain dangerous forces in an effort to halt or impede an advancing army; Jozef Goldblat, "The mitigation of environmental disruption by war: legal approaches," in Arthur H. Westing, ed., Environmental Hazards of War: Releasing Dangerous Forces in an Industrialized World (London: PRIO/UNEP, 1990), p. 51.

687. Philip Shenon, "Massing on Border," New York Times, 23 January 1991, p. 1.

688. David C. Morrison, "War on the Environment," National Journal, 2 March 1991, p. 536.

689. Rowan Scarborough, "Ground attacks flush Iraqi units," Washington Times, 26 February 1991; Joby Warrick, "War's End: Bush claims victory 'for all mankind,'" Air Force Times,

11 March 1991, p. 8; Deborah Schmidt, "Marine drive opens Kuwait City," Air Force Times, 11 March 1991, p. 6; Jeffrey M. Lenorovitz, "Allies Fly Defensive Missions After Air War Smashes Iraq," Aviation Week & Space Technology, 11 March 1991, p. 18.

690. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991. See also Donatella Lorch, "Burning Wells Turn Kuwait Into Land of Oily Blackness," New York Times, 6 March 1991, p. A1; and testimony by a Saudi pilot on CBS Evening News, 22 February 1991.

691. Rowan Scarborough, "Ground attacks flush Iraqi units," Washington Times, 26 February 1991.

692. Martin Marris (Dhahran), "Gulf-Weather and Smoke," 24 February 1991.

693. Molly Moore, Washington Post, Pool Report from Kuwait City, 28 February 1991.

694. Ray Wilkinson, Newsweek magazine, pool report on the outskirts of Kuwait City, 26 February 1991.

695. Steve Vogel, Times Journal, Pool Report from "an airbase in Northern Saudi Arabia," 27 February 1991.

696. Jeff Franks, Reuters, Pool Report with the "US Marines in Kuwait," 26 February 1991.

697. Rowan Scarborough, "Ground attacks flush Iraqi units," Washington Times, 26 February 1991.

698. Defense Nuclear Agency (David L. Auton), "Battlefield and Theater Smoke Cloud Experiments," 4 March 1991 (Briefing), released under the FOIA to the Natural Resources Defense Council, Inc., Washington, DC.

699. Tom Diaz, "Iraqi revolt still rages," Washington Times, 19 March 1991, p. 1.

700. Jonathan C. Randal, "Iraq Says Rebellion Toll High," Washington Post, 18 March 1991, p. 1.

701. Elaine Sciolino, "Iraqi Gains Against Rebels Sometimes Fade, U.S. Says," New York Times, 13 March 1991, p. A13.

702. Nora Boustany, "A Trail of Death in Iraq," Washington Post, 26 March 1991, p. 1.

703. Susan Okie, "30,000 Fleeing War Get Shelter in Iran, U.N. Officials Say," Washington Post, 20 March 1991, p. A14.

704. John M. Goshko, "Kurds Ousted From Kirkuk, Baghdad Says," Washington Post, 29 March 1991.

705. Medecins Sans Frontieres USA, Inc. ("Doctors Without Borders"), Statement by Dr. Marcel Roux Regarding the Dramatic Situation in Kurdish Iraq and on the Iraq Turkey Border. Presented to the Human Rights Caucus, 11 April 1991, p. 1.

706. Elaine Sciolino, "Iraqi Gains Against Rebels Sometimes

Fade, U.S. Says," New York Times, 13 March 1991, p. A13; John M. Goshko, "Kurds Ousted From Kirkuk, Baghdad Says," Washington Post, 29 March 1991.

707. CRS, "Reparations," CRS Report 91-22A, March 1991.

708. The Navy manual on international law cites five methods for "inducing the observance of legitimate warfare...in the event of a clearly established violation of the law:"

1. Publicize the facts with a view towards influencing world opinion against the offending nation.
2. Protest to the offending nation and demand that those responsible be punished and/or that compensation be made.
3. Seek the intervention of a neutral party, particularly with respect to protection of prisoners of war.
4. Execute a reprisal action.
5. Punish individual offenders either during the conflict or upon cessation of hostilities.

NWP-9 Supplement, pp. 6-7 to 6-9.

709. Recently, non-governmental bodies such as the ICRC and UN Teams of Experts have functioned as de facto enforcement bodies for the laws of war. Through cataloguing, researching and publicizing evidence of war crimes, and bringing to bear political pressures on offending governments, relief is often achieved. There is also the authority for the creation of a UN Fact Finding Mission under the Geneva Protocols I (Article 90).

### Conclusion

710. New efforts were supposedly introduced to guard against collateral damage to civilians. Gen. Schwarzkopf said that, "by requiring that the pilots fly in a certain direction of flight or use a certain type of munition that requires them to go to altitudes that they normally wouldn't be required to go to, those pilots are at much more risk than they would be otherwise. But we have deliberately decided to do this in order to avoid unnecessary civilian casualties;" CENTCOM Briefing, Gen. Norman Schwarzkopf, Riyadh, Saudi Arabia, 27 January 1991. It is unclear whether this is true. Col. Hays Parks, chief of international law in the Office of the Judge Advocate General of the Army, wrote in the March 1991 issue of Proceedings that:

The...rules of engagement...reflect the traditional concern of US forces for avoidance of incidental injury to innocent civilians. Missions are planned with the admonition to take reasonable measures to minimize collateral civilian casualties, consistent with mission accomplishment and allowable risk to US and allied forces. Measures to minimize collateral damage to civilian objects are not to include steps that would place US and allied lives at greater or unnecessary risk.

Col. W.H. Parks, USMCR, "Rules of Engagement: No More Vietnams," Proceedings, March 1991, pp. 27-28 (emphasis added).

711. The Amiriya shelter bombing illustrates an important new norm regarding the attack of civilian objects. And the handling of the Amiriya incident by the US government shows that the application of proportionality with regard to civilians may no longer in itself be acceptable. The defense which emerged of the unfortunate action by US stealth fighters was not that the civilian casualties were acceptable. Nor was it that the US thought it likely or possible that civilians would be present,

that the value of the target necessitated such an attack. Rather the defense was that the US did not know civilians would be present, implying that if they had known the target would not have been attacked. The issue turned then on the question of adequate intelligence and sound judgement, rather than proportionality.

712. Attempts to legally restrict further the use of napalm and other incendiary, cluster and fragmentation weapons have failed thus far. DOD policy states that all weapons newly developed or purchased by the US armed forces must be reviewed for consistency with international law, by Judge Advocate General of each service; NWP 9 Supplement, p. 9-11.

713. Josette Shiner, "The Earth is Bleeding: Kuwait landscape 'surreal,'" Washington Times, 19 March 1991, p. 1.

714. NWP 9 Supplement, p. 7-10.

715. Jonathan Schell, "A Terrible War But No Contest," Newsday, 20 January 1991, p. 41.

716. Richard Cohen, "In Search of a Gulf Strategy," Washington Post, 28 March 1991.

## Appendix A: The Weapons of the Air War

Major conventional weapons delivered by aircraft in the Gulf War included:

- general purpose bombs,
- guided bombs,
- fire bombs, or napalm,
- fuel air explosives and "daisy cutters,"
- combined effects munitions, or cluster bombs, and
- air-to-surface missiles.

About 30 different types of air-delivered weapons were used by US forces in the war, as well as large amounts of gun ammunition ranging up to 30mm in size, and unguided 2.75-inch rockets.

**General Purpose Bombs.** Four types of general purpose ("dumb") bombs were employed by US forces, three of the Mk 80 series of weapons, and one used by the B-52 bomber. The three Mk 80 series bombs are the Mk 82 500 lb bomb, the Mk 83 1,000 lb bomb, and the Mk 84 2,000 lb bomb.<sup>1</sup> These are the most common bombs in the US inventory; their cases are relatively light, and approximately 50 percent of the bomb weight is explosive. The M117 750 lb bomb, "the preferred general purpose bomb used by the B-52" bomber, was also widely used.<sup>2</sup>

These were the most numerous weapons delivered; the Navy alone (flying 16 percent of the total sorties) reportedly delivered 15,578 Mk 80 series bombs.<sup>3</sup> On 30 January, 18 F-18 Hornets from the aircraft carrier USS Saratoga delivered 100,000 pounds of Mk 83 1,000 lb bombs on Iraqi positions in Kuwait, the largest amount of bomb tonnage carried in a single Navy mission.<sup>4</sup> It is believed that at least 150,000-170,000 general purpose bombs were dropped in the war, some 70 percent of the total number of weapons delivered.<sup>5</sup>

**Guided Bombs.** Eight types of guided bombs were employed by US forces. These "smart weapons" mostly carried laser guidance systems; a small number had electro-optical (television) or imaging infrared guidance.<sup>6</sup>

The guided bombs consist of standard Mk 80 series general purpose bombs or the new Improved 2,000 lb (I-2000) hard target munition (also known as the I2K), with added stabilizer fins and a guidance system. The laser guidance system, for instance, is a computerized directional computer and control mechanism, with a seeker. After the bomb is released from the aircraft, it homes in on reflected laser radiation provided by either an airborne or ground-based laser designator. There were two basic generational groups of low-level laser-guided bombs (LLLGB) employed against Iraq, the first/second generation late Vietnam-vintage GBU-10s and GBU-12s; and the 1980s generation of more accurate and reliable GBU-24s and GBU-27s.

The eight weapons used in the war include:

- the AGM-130 electro-optically or infrared guided 2,000 lb powered guided bomb (a rocket boosted upgraded version of the GBU-15), reportedly employed by Air Force

F-111s,

- the GBU-10 Paveway II 2,000 lb laser-guided bomb based on a Mk 84 bomb, employed by Air Force F-15E<sup>7</sup> and F-117,<sup>8</sup> and by Navy and Marine Corps aircraft,
- the GBU-10I Paveway II 2,000 lb laser-guided bomb with I-2000 hard target munition, employed exclusively by Air Force F-117 in small numbers,<sup>9</sup>
- the GBU-12 Paveway II 500 lb laser-guided bomb based on a Mk 82 bomb, employed by Air Force F-117s,<sup>10</sup> and by F-15Es<sup>11</sup> and F-111s in an anti-tank role,<sup>12</sup> and by Navy and Marine Corps aircraft,
- the GBU-15 electro-optically guided 2,000 lb Mk 84 "glide bomb," first developed in 1974, and employed in small numbers by Air Force F-111 and F-15E fighters, and possibly B-52 bombers,<sup>13</sup>
- the GBU-24 Paveway III 2,000 lb laser-guided low-level weapon (with BLU-109 bomb, with mid-course autopilot, and a more sensitive seeker), employed by Air Force F-111s and F-15Es to destroy chemical, biological, and nuclear storage areas, bridges, aircraft shelters, and other strategic targets,<sup>14</sup>
- the GBU-27 Paveway III 2,000 lb laser-guided bomb with I-2000 hard target munition on the BLU-109/B, a "black program" adapted version of the GBU-24, used exclusively by Air Force F-117 stealth fighters to attack aircraft shelters, bunkers, and other strategic targets in Baghdad,<sup>15</sup> and
- the GBU-28 5,000 lb "bunker busting" laser-guided bomb, fabricated especially for the war "in an effort to destroy extremely hardened, deeply buried Iraqi command and control bunkers, kill senior military officials and possibly kill Saddam Hussein." The GBU-28 was fielded "late in the war," and had an extremely large explosive surrounded by an old retooled Army 8-inch artillery gun barrel. Only two bombs were reportedly delivered by F-111F aircraft in the last week of February, to destroy an underground bunker complex just north of Baghdad.<sup>16</sup>

The number of guided bombs delivered is very small compared with general purpose bombs. Air Force aircraft used more than 8,000 laser-guided bombs.<sup>17</sup> The Navy and Marine Corps reportedly delivered 1,079 guided bombs.<sup>18</sup> According to the Air Force, the older generation of guided weapons, including the GBU-10, GBU-12, and GBU-15, "were expended in significant numbers" during the war.<sup>19</sup> It is believed that a total of some 9,000-10,000 guided bombs were dropped, or four percent of the total weapons used. British aircraft also dropped US laser-guided bombs.

**Fire Bombs or Napalm.** It is believed that one type of fire bomb (napalm) was used by the Marine Corps, either the Mk-77 500 lb bomb with a fuel capacity of 75 gallons, or the BLU-27 750 lb bomb with a fuel capacity of 100 gallons.<sup>20</sup> The Mk-77 is capable of creating a destructive elliptical ground pattern approximately 215 feet long in the direction of delivery and 75 feet wide.<sup>21</sup>

On 22 February, ABC TV World News Tonight reported that Marine F-18s had begun using napalm on Iraqi defensive positions on about 20 February -- "They denied the fiery gel has been used against Iraqi troops and say the napalm is being dropped into

ditches the Iraqis had filled with oil and planned to ignite as a barrier against advancing ground forces."<sup>22</sup> The New York Times reported on 23 February that Marine AV-8B Harrier aircraft were delivering napalm.<sup>23</sup> It is not believed that any napalm was used against Iraqi troops in the war.<sup>24</sup>

**Fuel Air Explosives and "Daisy Cutters."** Fuel air explosives (FAE) were used in the war, also in small numbers, both to destroy minefields and bunkers on the battlefield. On 16 February, Air Force B-52 bombers reportedly began dropping FAEs on Iraqi military positions. It is believed that Marine Corps aircraft employed FAEs as well.<sup>25</sup> The New York Times reported that FAEs were dropped over minefields, detonating pressure sensitive mines.<sup>26</sup> Jane's Defence Weekly reported that the FAEs were also being used against Iraqi bunkers on the battlefield.<sup>27</sup>

The common type FAE in the US arsenal is the CBU-72 FAE dispenser weapon with three BLU-73 bombs.<sup>28</sup> The CBU-72 is released by the delivering aircraft, and the BLU-73s are extracted from the dispenser, forming a pattern above the target. Each BLU-73 contains an ethylene oxide fuel which forms an aerosol cloud on impact. The cloud is then detonated, forming very high overpressures; and the resulting blast wave (shock wave) destroys anything within the zone of effectiveness -- for a 2,000 lb bomb, an area of about 50,000 sq. ft. US Defense Department officials state that FAE were used against Iraqi troops when employed against bunkers and defensive fortifications, but were not used against troops in the open.<sup>29</sup>

In mid-February, US officials confirmed that US forces were using so called "daisy cutters" or the BLU-82 ("Big Blue 82") 15,000 lb bombs, to clear minefields and barriers. The concussion type bomb carries a 10,000 lb warhead of GSX, a gelled slurry blast explosive. A small number of the bombs were dropped by AC/MC-130 Air Force special operations transport aircraft.<sup>30</sup>

**Combined Effects Munitions (CEM) or Cluster Bombs.** Eight types of combined effects munitions (cluster bombs) were employed by US forces.<sup>31</sup> Carried and fired by a wide variety of aircraft, cluster bombs were employed in both anti-personnel and anti-vehicle attacks (such as attacks on trucks and radar vans), as well as in attacks against airfields and other large area targets, such as missile sites, and fuel storage tanks.

In a cluster bomb, the bomb casing, or dispenser, is filled with a large number of small weapons, often called cluster bomb units (CBU) or submunitions. The typical bomblet pattern of the Rockeye dispenser, for instance, when delivered from 500 ft., can cover a 30,000 sq. ft. oval.<sup>32</sup> The shaped-charge warhead can penetrate six inches of armor plate. A single B-52 bomber carrying cluster bombs can deliver more than 8,000 bomblets in one mission.

The US cluster bombs employed in the war were:<sup>33</sup>

- the Mk-20/70 Rockeye I/II bomblet dispenser, including the Rockeye II with 247 Mk-118 bomblets; and the CBU-78 GATOR (air scatterable land mine weapon), with 45 anti-tank and 15 anti-personnel mines.<sup>34</sup> Some 26,000 Rockeyes were employed by virtually all types of Air Force, Navy and Marine Corps aircraft in the war; the Air



Force employing some 6,000-7,000 Mk-70 Rockeye IIs, the Navy 4,473 Mk-20 Rockeyes, and the Marine Corps some 12,000 Mk-20 Rockeyes,<sup>35</sup>

- the CBU-52 800 lb cluster munition, with 220 BLU-61 fragmentation bomblets for light armor and anti-personnel attack, employed by Air Force F-15E, F-16, and F-111 aircraft, and possibly A-10s<sup>36</sup> (the CBU-52/58/71 are of the same family of weapons),<sup>37</sup>

- the CBU-58 800 lb cluster munition, with 650 BLU-63 fragmentation bomblets for light armor and anti-personnel attacks, employed by Air Force F-15E, F-16 and F-111 aircraft, and possibly A-10s,<sup>38</sup>

- the CBU-71 800 lb cluster munition, with 670 BLU-86 fragmentation bomblets or the GATOR target-activated land mine, employed by Air Force aircraft, including the F-15E, F-16, and F-111, and possibly Air Force A-10s,<sup>39</sup>

- the CBU-87 1,000 lb combined effects munition (CEM) containing 202 BLU-97B armor-piercing submunitions, each weighing 1.54 kg,<sup>40</sup> employed by Air Force F-15E and F-16 aircraft<sup>41</sup> in SCUD missile attacks and other "area denial" attacks,<sup>42</sup> as well as by B-52 bombers,<sup>43</sup> and British Jaguars,<sup>44</sup> and

- the CBU-89 1,000 lb GATOR target-activated land mine, employed by Air Force F-15E aircraft,<sup>45</sup>

In addition, British aircraft carried the BL755 Improved 275 kg cluster bomb, with 147 bomblets; and the JP233 5,000 lb airfield attack weapon, with 30 runway-cratering munitions and 215 area-denial mines. French Jaguar aircraft also employed the Belouga 300 kg cluster bomb, with 151 bomblets; and the Durandal rocket-boosted runway cratering bomb.<sup>46</sup>

It is estimated that some 60,000-80,000 cluster bombs were dropped, including some 26,000 Rockeyes (20 percent of the entire US stock). This comprised about one-fourth of all the weapons delivered by air.

**Air-to-surface Missiles.** Seven types of US air-to-surface missiles were used: Walleye, Maverick, Hellfire, SLAM, Shrike, HARM, and Have Nap.<sup>47</sup> These missiles provided increased accuracy and effectiveness over bombs, with specialized capabilities against specific types of targets, such as air defense and early warning radars. The Walleye, Maverick, Hellfire, SLAM, and Have Nap missiles were standard air-to-surface stand-off weapons, mostly specializing in anti-armor attacks. The Shrike and HARM missiles are anti-radiation missiles, specializing in radar attacks and air defense suppression.

The seven missiles used are:

- the 2,500 lb Mk 5 Walleye II (AGM-62) electro-optical air-to-surface glide bomb, with 2,000 lb warhead. Walleye uses automatic video tracking for homing and guidance to surface targets, and was employed by Navy and Marine Corps aircraft,<sup>48</sup>

- the 600 lb Maverick (AGM-65) electro-optically, laser or infrared guided anti-tank missile, with 300 lb warhead, employed extensively by Air Force A-10 and F-16 aircraft, Marine Corps F-18 and AV-8B aircraft,<sup>49</sup>

- the 100 lb Hellfire (AGM-114) laser-guided anti-tank missile employed extensively by Army AH-64 Apache and Marine Corps AH-1 Cobra helicopters,<sup>50</sup>
- the 1,500 lb SLAM standoff land attack missile (AGM-84E), an air-launched imaging infrared guided derivation of the Harpoon anti-ship missile, with 500 lb warhead, employed in extremely small numbers on an experimental basis by Navy A-6 and F-18 fighters,<sup>51</sup>
- the 400 lb Shrike (AGM-45) older-generation anti-radiation missile, with 150 lb warhead, employed by Navy aircraft,<sup>52</sup>
- the 800 lb HARM high-speed anti-radiation missile (AGM-88), with 150 lb warhead, employed by Air Force F-4G and Navy and Marine Corps A-6, A-7, EA-6, and F-18 aircraft,<sup>53</sup> and
- the 1,000 lb "Have Nap" (AGM-142A) bunker busting electro-optically guided missile, reportedly carried by B-52 bombers.

The UK also employed the ALARM anti-radar missile on Tornados (some 100 were fired), and France employed the ARMAT anti-radar missile on Jaguars and Mirage F1s.

Some 12,000 air-to-surface missiles were employed, more than 2,000 anti-radiation missiles; less than 1,000 Walleyes, a handful of Have Naps, eight SLAM missiles, and some 7,000-10,000 anti-tank Maverick and Hellfire missiles.

1. Ninety percent of navy bombs dropped in Vietnam were Mk 82s, with Mk 83s accounting for most of the rest; Norman Friedman, The Naval Institute Guide to World Naval Weapons Systems (Annapolis, MD: Naval Institute Press, 1989), p. 98. The Mk 81 250 lb bomb is obsolete.
  2. Statement of Major General James W. Hopp, Director of Supply, US Air Force, Subject: Ammunition Procurement; Other Procurement, Air Force, Presentation to the Senate Armed Services Committee, 24 April 1991, p. 10.
  3. Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991.
  4. Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
  5. There is a dwindling stock of Mk 83 bombs in the US inventory, and some 40 percent of the entire US stock was expended during the war; John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.
  6. The Paveway series (also known as low-level laser-guided bombs (LLLGB) (GBU-10, GBU-12, and GBU-24) are the standard laser-guided bomb, with a generic seeker/wing combination fitted to Mk 80 series general purpose bombs. The newest guided bomb, the AGM-130, which is believed to have been used in small numbers, has an infrared guidance system.
  7. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54.
  8. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51. It is not believed that F-16 aircraft employed the GBU-10 during the war.
  9. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51.
  10. Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51.
  11. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54.
  12. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 7. According to Aviation Week, the F-111F "found a new role by dropping hundreds of 500-lb., laser-guided bombs on armored vehicles;" David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.
  13. Some 75 GBU-15s were employed by Air Force aircraft; David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.
  14. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 7.
  15. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 7; Michael A. Dornheim, "Trapeze Gives F-117 Ability to Carry Variety of Weapons," Aviation Week & Space Technology, 1 April 1991; Michael A. Dornheim, "F-117A Pilots Conduct Precision Bombing in High Threat Environment," Aviation Week & Space Technology, 22 April 1991, p. 51; John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.
  16. John D. Morrocco and David A. Fulghum, "USAF Developed 4,700-Lb. Bomb in Crash Program To Attack Iraqi Military Leaders in Hardened Bunkers," Aviation Week & Space Technology, 6 May 1991, p. 67. The Air Force's new bomb was first reported by CDR Steve Endacott, "Desert Storm Report," Wings of Gold, Spring 1991.
  17. David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.
  18. Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991.
  19. Statement of Major General James W. Hopp, Director of Supply, US Air Force, Subject: Ammunition Procurement; Other Procurement, Air Force, Presentation to the Senate Armed Services Committee, 24 April 1991, p. 5. These bombs will not be replenished by the Air Force.
  20. The F-16 can also deliver the BLU-27. The BLU-29B 200 lb bomb is also a fire bomb carried by B-52 bombers. It is believed to be obsolete. The BLU-32 700 lb bomb is also a fire bomb carried by the A-10.
  21. Marine Corps Development and Education Command, "Fleet Marine Force Aviation," IP 5-7, September 1984, p. 40.
  22. See also Eric Schmitt, "Why Iraqi Battle Threat Fizzled: Allied Strengths and Enemy Weaknesses," New York Times, 4 March 1991, p. 9; Department of the Navy, "Navy-Marine Corps Team -- Desert Storm 1991," Spring 1991.
  23. Malcolm W. Browne, "Allies Are Said to Choose Napalm For Strikes on Iraqi Fortifications," New York Times, 23 February 1991.
  24. Private communications with the authors.
  25. The importance of FAEs to the US military is questionable. According to Aviation Week & Space Technology, "the conflict ended before they [fuel air explosives] could be employed in any quantity. The U.S. only has a limited number of fuel air explosives and when the Middle East conflict erupted, they couldn't be found. They were tracked down to a Navy depot that had been transferred to the Army. 'Nobody knew they were out there,' a Pentagon official said;" John D. Morrocco, "Looming Budgets Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, pp. 66-67.
- In the FY 1992 budget request, the Marine Corps reported termination of the Surf Zone Mine Clearing System, also known as CATFAE for Catapult-launched Fuel Air Explosive. According to the Marine Corps, "The reasons for the CATFAE termination were twofold. There was a significant decline since program inception in the percentage of

threat mines that the system would have been capable of neutralizing. Additional, a development cost growth of \$10 to \$20 million and further program delays were anticipated;" Statement of Major General Jeremiah W. Pearson, III, United States Marine Corps, Commanding General, Marine Corps Research, Development, and Acquisition Command, before the Subcommittee on Defense, House Appropriations Committee, 17 April 1991, p. II-5.

26. Eric Schmitt, "Why Iraqi Battle Threat Fizzled: Allied Strengths and Enemy Weaknesses," New York Times, 4 March 1991, p. 9.

27. Barbara Starr, "FAEs used to clear mines," Jane's Defence Weekly, 23 February 1991, p. 247.

28. Two other types of FAEs are the 500 lb BLU-95, known as FAE I; and the 2,000 lb BLU-96, known as FAE II.

29. Private communications with the authors.

30. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," April 1991, p. 6. 31. Air Force aircraft may also have used the Durandal airfield attack weapons, a French munition. This 440 lb parachute-retarded, rocket-boosted, kinetic penetrator explodes below runway surfaces.

32. Norman Friedman, The Naval Institute Guide to World Naval Weapons Systems (Annapolis, MD: Naval Institute Press, 1989), p. 100.

33. The CBU-85 may also have been employed in attacks on troops and trucks, but no further information is available. It is not believed that the CBU-75 Sadeye was used in the war.

34. The Rockeye II was first deployed in 1968, and the CBU-78 GATOR was first deployed in 1984. It is not believed that the CBU-59 APAM (anti-personnel/anti-material) version of Rockeye, with 717 BLU-77 bomblets, and first deployed in 1974, was employed in the war.

The FY 1991 Desert Storm supplemental budget requests 48 CBU-78 GATOR for the Marine Corps.

35. Roughly 20 percent of the entire US inventory of anti-tank Rockeye munitions were expended in the war; John D. Morrocco, "Looming Budget Cuts Threaten Future of Key High-Tech Weapons," Aviation Week & Space Technology, 22 April 1991, p. 66.

Rockeye will be augmented with the Sensor Fuzed Weapon (SFW), a new Air Force antiarmor weapon, earmarked for a production start in FY 1992; Statement of Major General James W. Hopp, Director of Supply, US Air Force, Subject: Ammunition Procurement; Other Procurement, Air Force, Presentation to the Senate Armed Services Committee, 24 April 1991, p. 5.

36. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54; "F-16As Prove Usefulness in Attack Role Against Iraqi Targets in Desert Storm," Aviation Week & Space Technology, 22 April 1991, p. 62.

37. The FY 1991 Desert Storm supplemental requests 15,564 CBU- 52/58/71 cluster bombs for the Air Force.

38. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54; "F-16As Prove

Usefulness in Attack Role Against Iraqi Targets in Desert Storm," Aviation Week & Space Technology, 22 April 1991, p. 62.

39. According to the Air Force, "some area denial antiarmor weapons such as Gator were used to a lesser degree because the Iraqi Army's tanks were entrenched and did not become a mobile force until the waning days of the conflict;" Statement of Major General James W. Hopp, Director of Supply, US Air Force, Subject: Ammunition Procurement; Other Procurement, Air Force, Presentation to the Senate Armed Services Committee, 24 April 1991, p. 5.

40. Bill Sweetman, "Modern bombs in the Gulf," Jane's Defence Weekly, 9 February 1991, p. 178.

41. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54; "F-16As Prove Usefulness in Attack Role Against Iraqi Targets in Desert Storm," Aviation Week & Space Technology, 22 April 1991, p. 62.

42. CENTCOM Briefing, Gen. Norman Schwarzkopf, Brig. Gen. Buster Glosson, Riyadh, Saudi Arabia, 30 January 1991.

43. The Air Force had decided in the fiscal year 1992 budget process to terminate the CBU-87 program. "However, given the success of CEM in Desert Storm, and the number expended, two actions are presently underway. First is the replacement of Desert Storm consumption with FY 1991 supplemental funding. Second is the reevaluation of the CEM requirement due to extensive Desert Storm expenditure of older cluster munitions used as a substitute for the CBU-87. These Vietnam War era weapons have certain limitations on delivery parameters, and are beginning to show less reliability as they age, thus necessitating a reassessment of our overall inventory posture;" Statement of Major General James W. Hopp, Director of Supply, US Air Force, Subject: Ammunition Procurement; Other Procurement, Air Force, Presentation to the Senate Armed Services Committee, 24 April 1991, p. 12.

The FY 1991 Desert Storm supplemental requests 8,675 CBU-87 CEMs.

44. "Air war doctrine affirmed," Jane's Defence Weekly, 4 May 1991, p. 738.

45. Jeffrey M. Lenorovitz, "Air Crew Training, Avionics Credited For F-15E's High Target Hit Rates," Aviation Week & Space Technology, 22 April 1991, p. 54.

The FY 1991 Desert Storm supplemental budget requests 2,396 CBU-89 cluster bombs for the Air Force.

46. "A Guide to Gulf War Weapons," Flight International, 19 February 1991, p. 34. According to Jane's Defence Weekly, British aircraft ceased using the BL755 because it had switched to operating at a higher altitude, where the weapon was no longer optimized. It started to use the US CBU-87 instead; "Air war doctrine affirmed," Jane's Defence Weekly, 4 May 1991, p. 738.

47. The possibility exists that the Navy or Marine Corps also employed Sidarm (AGM-122) missiles in the war, but this is not confirmed. Airborne TOW anti-tank missiles were also employed by attack helicopters. 48. It is not thought that Walleyes were used in large numbers. The Navy, for instance, reportedly fired 124 Walleyes; Eric Rosenberg, "Navy Touts Its

Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991.

49. According to Aviation Week, 5,500 Maverick missiles were fired by Air Force aircraft in the war; David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.

50. According to Army Magazine, Apaches "fired at least 2,900 Hellfire antitank missiles, although the figure could rise to 4,000-5,000 when all the reports have been written;" "Modernization Program Systems Prove Themselves in the Desert," Army, May 1991, p. 14.

51. Navy A-6s and A-7s launched the SLAM for the first time on 19 January. The Navy reportedly only fired seven SLAMs during the war; Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991.

52. George C. Wilson and George Lardner, Jr., "Low US Losses Credited to Strikes On Iraqi Radars," Washington Post, 21 January 1991.

53. Between 1,000-2,000 HARMs were fired at radar sites during the war; Bruce D. Nordwall, "Electronic Warfare Played Greater Role In Desert Storm Than Any Conflict," Aviation Week & Space Technology, 22 April 1991, p. 68. The Navy reportedly fired 644 HARMs; Eric Rosenberg, "Navy Touts Its Many Roles and Contributions In the Gulf War," Defense Week, 29 April 1991. According to Aviation Week, Air Force F-4G Wild Weasel aircraft fired about 1,000 HARMs; David A. Fulghum, "Desert Storm Success Renews USAF Interest in Specialty Weapons," Aviation Week & Space Technology, 13 May 1991, p. 85.

**Appendix B: International Law relating to Protection of the Environment during Warfare**

This appendix provides a chronological summary of the relevant legal instruments relating to protection of the environment during warfare. It also includes a summary of the current adherence to the various instruments by those nations with forces which engaged in combat during Desert Storm, and/or those who had significant combat capable land, sea, or air forces assigned to Desert Storm, as well as the permanent members of the UN Security Council.

**1. St. Petersburg Declaration, 1867**

This declaration is regarded as the first major international agreement prohibiting the use of a particular weapon in warfare. The development of bullets that exploded on hitting a surface led the Russian Imperial War Ministry to restrict their use against troops in 1867. The Ministry then urged Alexander II to propose a conference to renounce explosive bullets. Sixteen European states agreed in St. Petersburg to renounce the use of explosive or inflammable projectiles under 400 grams.

The convention is regarded as expressing the customary principle prohibiting the use of means of warfare causing unnecessary suffering, later embodied in the Hague Conventions II of 1899, and IV of 1907.

...

The commission having by common agreement fixed the technical limits at which the necessities of war ought to yield to the requirements of humanity, the undersigned... declare as follows:...

That the only legitimate object which states should endeavor to accomplish during war is to weaken the military force of the enemy.

That this object would be exceeded by the employment of arms which uselessly aggravate the sufferings of disabled men, or render their death inevitable.

...

Signed: France, UK, Russia, Italy, (Persia), Turkey, UAE.

Not signed: US, China, Bahrain, Canada, Egypt, Iraq, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria.

**2. Hague Convention (IV) Respecting the Laws and Customs of War on Land, 1907**

Having met with some success in 1899, a second Hague peace conference met in 1907 with a primary objective of limiting armaments. Once again no general agreement on arms limits was achieved, but thirteen conventions were adopted. The Hague IV

convention is largely the same as Hague II, which was the first successful effort at codifying a relatively comprehensive regime governing the laws of land warfare. The Hague conventions are considered declaratory of customary international law.

Hague IV lays out regulations for belligerents regarding prisoners of war, the conduct of hostilities including sieges, bombardment (in particular prohibiting the bombardment of undefended places) and occupation.

...

Article 22. The right of belligerents to adopt means of injuring the enemy is not unlimited.

Article 23. ...it is especially forbidden;

(a) To employ arms, projectiles, or material calculated to cause unnecessary suffering;...

(g) To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war;...

Article 25. The attack or bombardment, by whatever means, of towns, villages, dwellings or buildings is prohibited.

Article 26. The officer in command of an attacking force must, before commencing bombardment, except in cases of assault, do all in his power to warn the authorities....

Article 27. In sieges and bombardments all necessary steps must be taken to spare, as far as possible, buildings dedicated to religion, art, science, or charitable purposes, historic monuments, hospitals and places where the sick and wounded are collected, provided they are not being used at the time for military purposes....

Article 28. The pillage of a town or place, even when taken by assault, is prohibited....

Article 55. The occupying state shall be regarded only as administrator and usufructuary of public buildings, real estate, forests, and agricultural estates belonging to the hostile state, and situated in the occupied country. It must safeguard the capital of these properties, and administer them in accordance with the rules of usufruct.

Article 56. ...all seizure of, destruction or wilful damage done to institutions of this character, historic monuments, works of art and science, is forbidden, and should be made the subject of legal proceedings.

...

Ratified: France, UK, US, China, Soviet Union.

Signed: Italy, Turkey.

Not signed: Bahrain, Canada, Egypt, Iraq, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, UAE.

### 3. Rules of Aerial Warfare, Hague 1923

As air warfare increasingly became the method of warfare most directly affecting non-combatants, there was no single international agreement in force exclusively concerning air warfare or aerial bombardment. The 1921 Washington Conference on the Limitation of Armaments failed to produce an air warfare agreement. But there was agreement to appoint a commission of jurists to study this area. The subsequent Hague Rules are regarded as an authoritative attempt to clarify and formulate rules of air warfare, and largely correspond to customary rules of land and sea warfare (codified in the Hague Conventions).

Although never adopted in a legally binding form, they are regarded as part of customary international law, and parts are recognized as such by the US Air Force.

The rules relating to the conduct of aerial bombardment are most important. The Rules establish the principle that aerial bombardment to terrorize the civilian population or destroy and damage private property is prohibited. The rules also list the legitimate military objects of attack from the air.

...

Article 22. Aerial bombardment for the purpose of terrorizing the civilian population, of destroying or damaging private property not of military character, of injuring non-combatants is prohibited....

Article 24.

(1) Aerial bombardment is legitimate only when directed at a military objective...an object of which the destruction or injury would constitute a distinct military advantage to the belligerent.

(2) Such bombardment is legitimate only when directed exclusively at the following objectives: military forces; military works; military establishments or depots; factories constituting important and well-known centers engaged in the manufacture of arms, ammunition or distinctively military supplies; lines of communication or transportation used for military purposes.

(3) The bombardment of cities, towns, villages, dwellings or buildings not in the immediate neighborhood of the operation of land forces is prohibited. In cases where the objectives specified in paragraph (2) are so situated, they cannot be bombarded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment....

Article 25. In bombardment by aircraft, all necessary steps must be taken by the commander to spare as far as possible buildings dedicated to public worship, art, science, or charitable purposes, historic monuments, hospital ships, hospitals and other places...provided such buildings, objects or places must by day be indicated by marks visible to aircraft.

...



Not opened for signature.

#### 4. Geneva Protocol, 1925

The Protocol developed the existing principle against the use of projectiles whose sole object is the diffusion of asphyxiating or deleterious gases, found in Hague Convention II of 1899. It reaffirms the prohibition on the use (but not the possession) of chemical weapons and extends the prohibition to bacteriological methods of warfare. Parties undertake not to use in war asphyxiating poisonous or other gases, all analogous materials, liquids or devices and bacteriological devices.

The protocol allows reservations concerning use against non-parties, and in retaliation against non-observers of the Protocol. The Protocol is now seen as customary international law binding parties and non-parties alike. There are divergent interpretations about whether tear gas, herbicides or other non-lethal gases are covered.

In 1986 the United Nations Security Council condemned the use of chemical weapons by Iraq against Iran on the basis of the Geneva Protocol. The prospective Chemical Weapons Treaty under negotiation in the UN Conference on Disarmament will supersede the Protocol by establishing a global verifiable ban on production, development, stockpiling and use of chemical weapons.

Whereas, the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world...the prohibition shall be universally accepted as a part of International Law, binding alike on the conscience and the practice of nations;...the High Contracting Parties...agree to extend this prohibition to the use of bacteriological methods of warfare...

Ratified: France, UK, US, China, Soviet Union, Bahrain, Canada, Egypt, Iraq, Italy, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, Turkey.

Signed:

Not signed: UAE.

#### 5. Geneva Convention Relative to the Protection of Civilian Persons in Time of War, 1949

The body of the laws of armed conflict in the main part concerned treatment of combatants or prisoners of war, although the Hague declarations have specific sections on civilians. But the experience of First and Second World Wars showed the degree to which civilians were involved in fighting to the same or worse degree than combatants. This gave impetus to a new effort to develop rules to protect civilians in time of war.

The Convention is mainly concerned with treatment of civilians (and property) in

occupied territories. It contains little concerning the rules of conduct of bombardment itself, nor the protection of the environment. These areas are developed in the Additional Protocols I and II of 1977.

...

Article 53. Any destruction by the occupying power of real or personal property individually or collectively to private persons, or to the State, or to other public authorities, or to social or cooperative organizations is prohibited, except where such destruction is rendered absolutely necessary by military operations.

...

Ratified: UK, US, China, France, Soviet Union, Bahrain, Canada, Egypt, Iraq, Italy, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

#### 6. International Convention for Protection of Birds, Paris 1950

The parties undertake to protect birds in the wild state. With certain exceptions, protection is given to all birds, at least during their breeding season, and to migrants during their return flight to their nesting ground. Species which are in danger of extinction or which are of scientific interest are protected throughout the year.

Ratified: Turkey.

Signed: France.

Not signed: UK, US, China, Soviet Union, Bahrain, Canada, Egypt, Italy, Iraq, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, UAE.

#### 7. Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, 1954

The convention establishes special protection for cultural property from military activities. It provides for both preparations in peacetime for safeguarding cultural property against foreseeable effects of armed conflict, and also for respect for such property in time of war and/or occupation.

Following customary law, the protection is not absolute, if the cultural property is used for military purposes it releases an opposing belligerent. Also, cases of military necessity may be claimed, although advance notice of the attack is required. An additional protocol details provisions on the prevention of the export of cultural property from occupied territory.

The High Contracting Parties,

Recognizing that cultural property has suffered grave damage during recent armed

conflicts and that, by reason of the developments in the technique of warfare, it is in increasing danger of destruction;...

Article 4.

(1) The High contracting parties undertake to respect cultural property...by refraining from any use of the property and its immediate surroundings or of the appliances in use for its protection for purposes which are likely to expose it to destruction or damage in the event of armed conflict; and by refraining from any act of hostility directed against such property.

(2) The obligations mentioned in paragraph (1)...may be waived only in cases where military necessity imperatively requires such a waiver....

Ratified: France, Soviet Union, Egypt, Iraq, Italy, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, Turkey.

Signed: UK, US (intends to re-submit for ratification), Bahrain, Canada.

Not signed: China, UAE.

#### 8. Antarctic Treaty, 1959

Increasing claims to Antarctic territory and the prospect of economic exploitation led to the creation of the Antarctic Treaty. The treaty internationalizes and demilitarizes the entire region, and sets the framework for future peaceful economic use. It declares the Antarctic an area to be used exclusively for peaceful purposes.

Prohibited, inter alia, are any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres, as well as the testing of any type of weapons. Any nuclear explosion in Antarctica and the disposal there of radioactive waste material is prohibited, subject to future international agreements on these subjects.

The exclusion of armaments served as a model for the Latin American Nuclear Free Zone Treaty (Treaty of Tlatelolco), and the Seabed and Outer Space treaties.

...

Article 1.

(1) Antarctica shall be used for peaceful purposes only. There shall be prohibited, inter alia, are any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as testing of any type of weapons....

Article 5.

(1) Any nuclear explosions in Antarctica and the disposal there of radioactive waste material is prohibited....

Ratified: France, UK, US, China, Soviet Union, Canada, Italy.

Signed:

Not signed: Bahrain, Egypt, Iraq, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

9. Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, or the Partial Test Ban Treaty, 1963

Radioactive fallout from atmospheric testing in the early 1950s led to sustained public concern about environmental and human genetic damage. Discussions toward a test ban began in 1955 at the UN. Verification became the central technical problem and the final treaty relies on national technical means of verification. The feasibility of underground testing and the ability to continue development of nuclear weapons, greatly facilitated the treaty.

The parties undertake to prohibit nuclear weapon tests or other explosions (for 'peaceful purposes') in the atmosphere, outer space, underwater, and in any other environments if it causes radioactive debris to be present outside territorial limits. The Treaty does not prohibit underground testing, except where radioactive debris are present outside the testing country's jurisdiction. The treaty powers accept the goal of "an end to the contamination of the earth's environment by radioactive substances."

...

Article 1.

(1) Each of the Parties to this Treaty undertake to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control:

(a) in the atmosphere; beyond its limits, including outer space; or underwater including territorial waters or high seas;...

(b) and in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such an explosion is conducted.

...

Ratified: UK, US, Soviet Union, Canada, Egypt, Italy, Iraq, Pakistan, Kuwait, Syria, Turkey.

Signed:

Not signed: France, China, Bahrain, Qatar, Saudi Arabia, UAE.

10. Outer Space Treaty, 1967

With the advent of rocketry and earth orbiting vehicles in the late 1950s, many states put forward proposals at the UN to bar the use of space for military purposes. In

1963, the US and Soviet Union made statements at the UN that showed a desire not to orbit or station weapons of mass destruction in space, which the UN General Assembly subsequently voted to welcome.

States party to the treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in other manner. The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies are forbidden.

...

Article IV. States Party to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

...

Ratified: France, UK, US, China, Soviet Union, Canada, Egypt Iraq, Italy, Kuwait.

Signed:

Not Signed: Bahrain, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

#### 11. Treaty of Tlatelolco, 1967

Like the Antarctica Treaty and Outer Space Treaty, the Tlatelolco Treaty seeks to prevent the spread of nuclear arms to a region hitherto free of them. As early as 1963, an initiative came from Brazil, followed by a declaration of intent by five Latin American leaders to establish a nuclear-weapon free zone. The US supported the initiative as it did 'not disturb existing security arrangements' (unlike proposed zones in Europe) and removed a possible regional nuclear missile threat to the US.

Additional Protocols are established for nuclear weapon states, but this does not prohibit the transit of nuclear armed vessels in the region under traditional rights of freedom of passage.

The Treaty prohibits the testing, use, manufacture, production, or acquisition by any means, as well as the receipt, storage, installation, deployment and any form of possession of any nuclear weapons by Latin American countries. Specifically, the parties undertake to use exclusively for peaceful purposes the nuclear material and facilities which are under their jurisdiction, and to prohibit and prevent in their respective territories:

(a) the testing, use, manufacture, production, or acquisition by any means whatsoever of any nuclear weapons; and

(b) the receipt, storage, installation, deployment, and any form of possession of nuclear weapons in the land and sea area defined by the treaty in Latin America. The parties undertake to refrain from any involvement in any way in the manufacture, use or possession of nuclear weapons, and undertake to develop agreements with the International Atomic Energy Agency (IAEA) for international safeguards to guarantee nuclear material in their possession for civil use is not directed to military use.

Under Protocol I, states outside Latin American responsible for territories within, undertake to apply the statute of military denuclearization, as defined by the treaty, to such territories. Under Protocol II, the nuclear weapon states undertake to respect the statute of military denuclearization of Latin America, and not to use or threaten to use nuclear weapons within the zone.

Convinced,

That nuclear weapons, whose terrible effects are suffered, indiscriminately and inexorably, by military forces and civilian population alike, constitute, through the persistence of the radioactivity they release, and attack on the integrity of the human species and ultimately may even render the whole earth uninhabitable...

Article 1

1. The Contracting Parties agree to prohibit and prevent in their respective territories:

(a) The testing, use, manufacture, production or acquisition by any mean whatsoever of any nuclear weapons, by the Parties themselves, directly or indirectly, on behalf of anyone else or in any other way, and

(b) The receipt, storage, installation, deployment and any form of possession of any nuclear weapons, directly or indirectly, by the Parties or anyone on their behalf or in any other way.

...

Ratified: France, UK, US, China, Soviet Union, Canada, Egypt, Iraq, Italy, Kuwait, Pakistan, Saudi Arabia, Syria.

Signed:

Not signed: Bahrain, Qatar, Turkey, UAE.

## 12. Seabed Arms Control Treaty, 1971

In the 1960s there were great advances in the technology of oceanography and greatly increased interest in ocean floor resources. This led to a concern that the absence of international rules would cause conflict, and that the seabed would provide a new environment for military installations, and the launching of nuclear weapons. After the UN established an ad hoc committee on the question in 1967, the US signalled an interest in preventing a new arena for the arms race. The Soviet Union subsequently

tabled a treaty demilitarizing the seabed, while the US was concerned only with the stationing of nuclear weapons, not conventional weapons, or other military activity.

The parties undertake not to emplant or emplace on the seabed and the ocean floor, and in the subsoil thereof, beyond the outer limit of a seabed zone of 22 km, any nuclear weapons or other types of weapons of mass destruction; nor structures, launching installations or any other facilities specifically designed for storing, testing, or using such weapons.

Article 1.

(1) The States Party to this treaty undertake not to emplant or emplace on the seabed and the ocean floor and in the subsoil thereof beyond the outer limit of a seabed zone, as defined in Article II, any nuclear weapons or any other types of weapons of mass destruction as well as structures, launching installations or any other facilities designed for storing, testing or using such weapons.

...

Ratified: UK, US, Soviet Union, Canada, Iraq, Italy, Qatar, Saudi Arabia.

Signed:

Not signed: France, China, Bahrain, Egypt, Kuwait, Pakistan, Syria, Turkey, UAE.

13. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (London Dumping Convention), 1972

The London Dumping Convention establishes a regulatory framework for disposal of toxic and radioactive wastes at sea, that is increasingly prohibitive. The Convention is a source of the emerging customary law regarding responsibility to prevent pollution and damage to the environment of other states, or the environment in general. It should be noted, that under international law, when such principles become recognized as customary, states can be held responsible and become liable for violating these principles.

...

Article 1. Contracting Parties shall individually and collectively promote the effective control of all sources of pollution of the marine environment, and pledge themselves especially to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea...

Article 10. In accordance with the principle of international law regarding State responsibility for damage to the environment of other states or to any other area of the environment, caused by the dumping of wastes and other matter of all

kinds, the Contracting Parties undertake to develop procedures for the assessment of liability and the settlement of disputes regarding dumping.

...

#### 14. Biological Weapons Convention, 1972

The efforts of the 1932-1937 Disarmament Conference eventually failed to produce a regime for banning the possession of chemical and biological weapons. After the Second World War the issue became wrapped up with plans for General and Complete Disarmament. In 1969, the Soviet Union submitted a treaty to ban both kinds of weapons. The same year, President Richard Nixon conducted a review of US chemical and biological weapons programs and a decision was made to renounce biological warfare, as well as the first use of chemical weapons. Other countries made similar unilateral declarations and a treaty banning the possession of biological weapons swiftly followed at the UN. It is the only treaty outlawing an entire category of weapons.

The convention prohibits the possession and use of the entire category of biological weapons. The parties undertake never in any circumstances to develop, produce, stockpile, or otherwise acquire or retain:

(a) microbial or other biological agents, or toxins whatever their origin or method of production, of types and quantities that have no justification for prophylactic, protective, or other peaceful purposes; and

(b) weapons, equipment, or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

The destruction of the agents, toxins, weapons, equipment and means of delivery should be effected not later than nine months after the entry into force. The Convention does not prohibit the development of biological agents for peaceful purposes.

...

Article 1. Each State Party to this Convention undertake never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

(1) Microbial or other biological agents or toxins whatever their origin or method of production, of types and quantities that have no justification for prophylactic, protective or other peaceful purposes.

(2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.

...

Ratified: France, UK, US, China, Soviet Union, Bahrain, Canada, Egypt, Italy, Kuwait, Pakistan, Qatar, Saudi Arabia, Turkey.

Signed: Iraq, Syria, UAE.

Not signed:



15. Declaration on the Human Environment, Stockholm 1972

...

Principle 21. States have...the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.

...

Principle 26. Man and his environment must be spared the effects of nuclear weapons and other means of mass destruction. States must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons.

...

Signed: France, UK, US, China, Soviet Union, Bahrain, Canada, Egypt, Iraq, Italy, Kuwait, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

16. Convention Concerning the Protection of World Cultural Heritage, Paris 1972

The parties undertake to establish a list of world natural heritages selected from among many nominated by individual parties. The parties undertake not to take any deliberate measures which might damage these directly or indirectly. The parties undertake to establish a second list which shall include only those threatened by serious or specific dangers, such as the outbreak or the threat of armed conflict. Natural heritages are defined precisely, as physical, biological formations, and natural sites, having species facing extinction or having outstanding value from an aesthetic, scientific or conservation point of view.

...

Article VI.

1. The States party to this convention recognize that the natural heritage constitutes a world heritage for whose protection it is the duty of the international community as a whole to cooperate....

3. Each state party to this Convention undertakes not to take any deliberate measures which might damage directly or indirectly damage the...natural heritage...situated on the territory of other States party to this Convention.

...

Ratified: US, UK, China, Soviet Union, France, Canada, Egypt, Iraq, Italy, Pakistan, Saudi Arabia, Syria, Turkey.

Signed:

Not signed: Bahrain, Kuwait, Qatar, UAE.

17. International Law Association (ILA) Madrid resolution on the protection of water resources and water installations in times of armed conflict (57 ILA 234, 4 September 1976)

The International Law Association,  
Being aware of the destructive power of modern weapons;  
Taking into account the vital importance of water and water installations for the health and even the survival of people all over the world and the susceptibility of water and water installations to damage and destruction;...  
Article II. Water supply installations which are indispensable for the minimum conditions of survival of the civilian population should not be cut off or destroyed....  
Article IV. The destruction of water installations containing dangerous forces, such as dams and dikes, should be prohibited when such destruction may involve grave dangers to the civilian population or substantial damage to the basic ecological balance.

...

18. Protocol I on the Protection of Victims of International Armed Conflicts, Bern 1977 (additional to the Geneva Conventions of 1949).

The conduct of the Vietnam war and the preponderance of non-international conflicts and conflicts involving guerrillas and irregular forces since the Second World War, led to new efforts to update the humanitarian laws of war. In 1974, the Swiss government convened in Geneva the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law.

Protocol I was controversial in expanding the category of conflicts covered (e.g., wars against colonial domination), as well as the category of 'lawful combatants' to include certain types of guerilla activity. Protocol I also added new degrees of protection of civilians from indiscriminate attacks, and establishes a new limited protection for installations such as nuclear electrical generating stations that can release "dangerous forces." For the first time, there is a general environmental principle enunciated in a law of war document in Article 35.

Protocol I prohibits means of interstate warfare which are intended to, or may be expected to, cause widespread, long-term and severe damage to the natural environment. This treaty prohibits attack, or destruction of objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural areas for production of foodstuffs, crops, livestock, drinking-water installations and supplies, and irrigation works.

With certain exceptions, works containing dangerous forces -- namely, dams, dikes,

and nuclear electrical generating stations -- shall not be attacked, even when military objectives, if such an attack may release dangerous forces and severe losses among the civilian population. It is prohibited to make objects indispensable to the survival of civilians, or those that release dangerous forces, the object of reprisals.

Indiscriminate attacks -- those not directed at a specific military objective -- are prohibited, including an attack by bombardment which treats as a single military objective a number of clearly separated military objectives located in a city, town or village.

...

Article 35

(2) It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread long-term and severe damage to the natural environment....

Article 51

(5) Among others the following types of attack are to be considered 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;...

Article 54...

(2) It is prohibited to attack, destroy, remove or render useless objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural areas for either production of foodstuffs, crops livestock, drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive, whether in order to starve out civilians, to cause them to move away, or for any other motive....

Article 55

(1) Care shall be taken in warfare to protect the natural environment against widespread, long term, and severe damage. This protection includes the prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population....

Article 56

(1) Works or installations containing dangerous forces, namely dams, dikes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. Other military objectives located at or in the vicinity of these works or

installations shall not be made the object of attack if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the population.

(2) The special protection against attack provided by paragraph (1) shall cease:

(a) for a dam or dike only if it is used for other than its normal function and in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support;

(b) for a nuclear electrical generating station only if it provides electric power in regular, significant, and direct support of military operations and if such attack is the only feasible way to terminate such support;

(c) for other military objectives located at or in the vicinity of these works or installations only if they are used in regular, significant and direct support of military operations and if such an attack is the only feasible way to terminate such support.

...

For states parties see below, Protocol II.

19. Protocol II on the Protection of Victims of Non-International Armed Conflicts, Bern 1977 (additional to the Geneva Conventions of 1949).

Protocol II is similar to Protocol I but relates to intra-state or civil wars (but not sporadic internal tension, violence or disturbance. Previously the law of armed conflict applied to international conflict only, except under certain conditions. The prohibitions may apply to non-signatories of Protocol I, if those countries assist governments involved in civil wars or counter insurgency operations, which have signed Protocol II.

...

Article 14. Starvation of civilians as a method of combat is prohibited. It is therefore prohibited to attack, destroy, remove or render useless for that purpose, objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural area for the production of foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works.

Article 15. Works or installations containing dangerous forces, namely dams, dikes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population.

...

Ratified: Soviet Union (Protocol II only), France (Protocol II only), Canada (Protocol II

only), China, Bahrain, Italy, Kuwait, Qatar (Protocol I only), Saudi Arabia (Protocol I only), Syria (Protocol I only), UAE.

Signed: UK, US, Egypt, Pakistan.

Not signed: Iraq, Turkey.

## 20. Environmental Modification (ENMOD) Convention, 1977

In July 1972, there were detailed reports in the US press that the US military had been attempting to interfere with weather patterns in Vietnam to hinder communications and transport from North Vietnam to its forces in the south. At a time of opposition to the war and growing environmental awareness, the US Senate soon after held hearings on a resolution to seek a treaty to ban such techniques as a weapon of war. Also President Richard Nixon ordered a review by the US Department of Defense which found little prospective military value in these techniques.

US-Soviet negotiations soon followed and negotiations at the UN Conference on Disarmament. ENMOD is centrally concerned with manipulation of environmental forces as weapons, rather than damage to the environment per se.

The Convention prohibits military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to states party of the Convention. The term 'environmental modification techniques' refers to any technique for changing -- through the deliberate manipulation of natural processes -- the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere, and atmosphere, or of outer space.

The 1976 Conference on the Committee on Disarmament (CCD) understanding relating to Article II, gives a non-exhaustive list of phenomena which could be caused by environmental modification techniques: "earthquakes, tsunamis, an upset in the ecological balance of a region, change in weather patterns (clouds, precipitation, cyclones of various types and tornadic storms); changes in climate patterns; changes in ocean currents; changes in the state of the ozone layer; and changes in the state of the ionosphere". The CCD understanding relating to Article I defines widespread as "encompassing an area on the scale of several hundred square kilometers;" long lasting as "a period of months or approximately a season; severe as "involving serious or significant disruption or harm to human life, natural or economic resources and other assets."

Desiring to prohibit effectively military or any other hostile use of environmental modification techniques in order to eliminate the danger to mankind from such use...

### Article 1

(1) Each State party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long lasting or severe effects as the means of destruction, damage, or

injury to any other State Party.

Article 2. As used in Article 1 'environmental modification techniques' refers to any technique for changing through the deliberate manipulation of natural processes -- the dynamic, composition, or structure of the earth, including the biota, lithosphere, hydrosphere and atmosphere or of outer space.

Ratified: UK, US, Soviet Union, Canada, Egypt, Italy, Kuwait, Pakistan.

Signed: Iraq.

Not signed: France, China, Bahrain, Qatar, Saudi Arabia, Syria, Turkey, UAE.

21. Historical responsibility of states for the preservation of nature and future generations (UNGA Resolution 35/8, 30 October 1980)

Conscious of the disastrous consequences which a war involving the use of nuclear weapons and other weapon of mass destruction would have on man and his environment,

Noting that the continuation of the arms race, including the testing of various types of weapons, especially nuclear weapons, and the accumulation of toxic chemicals are adversely affecting the human environment and damaging the vegetable and animal world,

Bearing in mind that the arms race is diverting material and intellectual resources from the solution of the urgent problems of preserving nature...

1. Proclaims the historical responsibility of States for the preservation of nature for present and future generations;
2. Draws the attention of States to the fact that the continuing arms race has pernicious effects on the environment and reduces the prospects for the necessary international co-operation in preserving nature on our planet...

22. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be excessively Injurious or to Have Indiscriminate Effects, or Inhumane Weapons Convention, Geneva 1981

The initiative grew out of the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts from 1974-1977, which gave rise to the additional Protocols I and II to the Geneva Conventions. In 1977, the UN General Assembly voted for prohibitions or restrictions on the use of certain kinds of conventional weapons. The convention is different from other restrictions on particular weapons in affording protection primarily to civilians and civilian objects, from certain kinds of weapons.

The Convention and Protocols, inter alia, provide for protection of civilians and civilian objects from attacks by means of incendiary weapons, land mines and booby

traps, and prohibit entirely the use of any weapon the primary effect of which is to injure by fragments that cannot be detected in the human body. The basis of deciding differences of effect of certain weapons, and thus between 'humane' and 'inhumane' is magnitude of severity of the wounds, extent of the area they affect, and how well they can be controlled by their user (the principles of "excessive suffering" and "indiscriminate effects").

The Convention consists of a framework convention, and three protocols. Protocol I prohibits use of weapons intended to injure by fragments which are not detectable by X-ray in the human body. Protocol II prohibits use of land mines and booby traps, in a way that may cause indiscriminate harm to civilians. Protocol III bans indiscriminate methods of deploying incendiary weapons, and use against civilian or in populated areas. It also partially prohibits use against forest or other kinds of cover, unless they cover or are military objectives. No agreement was reached on incendiary weapons against combatants, the many other types of fragmentation weapons and Fuel Air Explosives.

The High Contracting Parties...

Also recalling that it is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long term and severe damage to the natural environment...

Protocol III

Article 1...

(3) 'Military objective' means, so far as objects are concerned, any object which by its nature, location, purpose or use makes an effective contribution to military action and whose partial or total destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.

(4) 'Civilian objects' are all objects which are not military objectives as defined in paragraph (3)....

Article 2...

(4) It is prohibited to make forests or other kinds of plant cover the object of attack by incendiary weapons except when such natural elements are used to cover, conceal or camouflage combatants or other military objectives, or are themselves military objectives.

...

Ratified: France (I and II only), China, Soviet Union, Pakistan.

Signed: UK, US, Canada, Egypt, Italy, Syria, Turkey.

Not signed: Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, UAE.

23. World Charter for Nature, New York (UNGA Resolution 37/7), 28 October 1982

The world charter for nature refers directly to the effects of warfare on the environment. The charter also provides an expression of several principles, also found elsewhere, that are regarded as emerging international environmental law.

General Principles...

Article 5. Nature shall be secured against degradation caused by warfare or other hostile activities....

Article 11.

e. Areas degraded by human activities shall be rehabilitated for purposes in accord with their natural potential and compatible with the well being of affected populations....

Article 12.

b. Special precautions shall be take to prevent discharge [into natural systems] of radioactive or toxic wastes....

Article 20. Military activities damaging to nature shall be avoided....

Functions...

Para 2. Activities which might have an impact on nature shall be controlled, and the best available technologies that minimize significant risks to nature or other adverse effects shall be used; in particular;

(a) activities which are likely to cause irreversible damage to nature shall be avoided;

(b) activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature, and where potential adverse effects are not fully understood, the activities should not proceed.

...

Signed: France, UK, China, Soviet Union, Bahrain, Canada, Egypt, Italy, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

Not signed: US.

24. Remnants of war (UNGA Resolution 37/215), 20 December 1982

The General Assembly...

Convinced that the responsibility for the removal of the remnants of war should be borne by the countries that planted them,

Recognizing that the presence of the material remnants of war, particularly mines, on the lands of developing countries seriously impedes their development efforts and causes loss of life and property,...

2. Regrets that no real measures have been taken to solve the problem of remnants of war despite the various resolutions and decisions adopted thereon by



the General Assembly and the Governing Council of the United Nations Environment Program;

3. Reiterates its support of the just demands of the States affected by the implementation of mines and the presence of remnants of war on their lands for compensation from the states responsible for those remnants;

25. United Nations Convention on the Law of the Sea, 1982

The Law of the Sea establishes a complex regime for peaceful uses of the ocean, from rules for merchant shipping to questions of sea bed minerals exploitation. The Law of the Sea is an example of a treaty that contains the emerging principle of customary international law regarding state responsibility for transboundary pollution (Article 194). This is also found in the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987. The Law of the Sea also contains the emerging principle of law that states have an obligation to protect the environment and a corresponding state liability for pollution (also found in the Convention on Marine Pollution from Land Based Sources, Paris 1974).

...

Article 194.

(2). States shall take measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other states and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this convention.

...

26. Protection of nuclear installations devoted to peaceful purposes against armed attack, IAEA General Conference (XXVII)/Res/407/14 October 1983

...

(e) Recalling that additional Protocol I to the Geneva Convention of 1949 prohibits attacks on peaceful nuclear electricity generating stations while other nuclear installations also devoted to peaceful uses are not covered by that prohibition, and

(f) Believing that it would further the cause of peace to extend the prohibition of armed attack so as to protect all nuclear installations devoted to peaceful purposes,

(1) Declares that all armed attacks against nuclear installations devoted to peaceful purposes should be explicitly prohibited;

(2) Urges all member states to make, individually and collectively and

through competent international organs, every possible effort for the adoption of binding international rules prohibiting armed attacks against any nuclear installation devoted to peaceful purposes;...

27. Consequences of the Israeli Military Attack on the Iraqi nuclear research reactor and the standing threat to repeat this attack for : (a) the development of nuclear energy for peaceful purposes; and (b) the role and activities of the International Atomic Energy Agency, IAEA General Conference (XXVIII)/RES/425, 28 September 1984

The General Conference,...

(2) Further considers that any threat to attack and destroy nuclear facilities in Iraq and in other countries constitutes a violation of the Charter of the United Nations and of the Statutes of the Agency;

...

28. Protection of nuclear installations devoted to peaceful purposes against armed attacks, IAEA General Conference (XXIX)/Res/444, 27 September 1985

The General Conference,...

(2) Considers that any armed attack on and threat against nuclear facilities devoted to peaceful purposes constitutes a violation of the principles of the United Nations Charter, international law and the Statute of the Agency;...

...

29. South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga) 1985

French underground nuclear testing at Muroroa in the Pacific Ocean has long been a source of concern and controversy to South Pacific island nations in the region. The South Pacific Forum, the organization comprising all of the independent states in the region, carried out two years of negotiations based on a proposal put forward by the Australian government in 1983, later supported by New Zealand in 1984. This nuclear free zone treaty does not in fact prohibit all nuclear activities. It allows parties to approve the transit and port visits of nuclear armed vessels and aircraft. Rarotonga does contain a mainly environmental prohibition on the dumping of any radioactive wastes in the region.

The Treaty prohibits the manufacture or acquisition by other means of any nuclear explosive device, as well as possession or control over such devices by the parties anywhere inside or outside the zone area. The parties also undertake not to supply nuclear material or equipment unless subject to IAEA safeguards; and to prevent in their territories the stationing as well as the testing of any nuclear explosive device. Each party remains free to allow visits, as well as transit, by foreign ships and aircraft.

Preamble,...

Determined to ensure, so far as lies within their power, that the bounty and beauty of the land and sea in their region shall remain the heritage of their peoples and their descendants in perpetuity to be enjoyed by all in peace; Determined to keep the region free of environmental pollution by radioactive wastes and other radioactive matter;...

Article 3. Each Party undertakes: (a) not to undertake or otherwise acquire, possess or have control over any nuclear explosive device by any means anywhere inside or outside the South Pacific Nuclear Free Zone; (b) not to seek or receive any assistance in the manufacture or acquisition of any nuclear explosive device; (c) not to take any action to assist or encourage the manufacture or acquisition of any nuclear explosive device by any State....

Article 7.1. Each Party undertakes: (a) not to dump radioactive wastes and other radioactive matter at sea anywhere within the South Pacific Nuclear Free Zone;...

Ratified: China (Protocols 2 and 3), Soviet Union (Protocols 2 and 3).

Not Signed: France, UK, US, Bahrain, Canada, Egypt, Italy, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Syria, Turkey, UAE.

30. Prohibition of all armed attacks against nuclear installations devoted to peaceful purposes whether under construction or in operation, IAEA General Conference (XXXIV)/Res/533, 21 September 1990

The General Conference,...

(b) Recalling resolution (GC XXIX)/RES/444...

(c) Recalling also resolution (GC XXXI)/RES/475...

1. Recognizes that attacks or threats of attacks on nuclear facilities devoted to peaceful purposes could jeopardize the development of nuclear energy;

2. Considers that the safeguards system of the Agency is a reliable means of verifying the peaceful uses of nuclear energy;

3. Recognizes that an armed attack or a threat of armed attack on a safeguarded nuclear facility, in operation or under construction, would create a situation in which the United Nations Security Council would have to act immediately in accordance with the provisions of the United Nations Charter;...

31. UN Security Council Resolution 686, 2 March 1991

The Security Council...

(3) Further demands that Iraq:

(d) Provide all information assistance in identifying Iraqi mines, booby

traps and other explosives as well as any chemical and biological weapons and material in Kuwait, in areas of Iraq where forces of Member States cooperating with Kuwait pursuant to resolution 678 (1990) are present temporarily, and in adjacent waters;...

32. UN Security Council Resolution 687, 3 April 1991

The Security Council,...

16. Reaffirms that Iraq, without prejudice to the debts and obligations of Iraq arising prior to 2 August 1990, which will be addressed through normal mechanisms, is liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources, or injury to foreign governments, nationals and corporations, as a result of Iraq's unlawful invasion and occupation of Kuwait;...

Sources: Adam Roberts and Richard Guelff, eds, Documents on the Laws of War, 2nd edition (Oxford: Clarendon Press, 1989); Arthur Westing, Warfare in a Fragile World: Military Impact on the Human Environment (London: Taylor and Francis (SIPRI), 1979, pp. 198-202; Burns H. Weston, Richard A. Falk, and Anthony A. D'Amato, Basic Documents in International Law and World Order (St. Paul, MN; West Publishing Co., 1980); Paul C. Szasz, The Environment and the Gulf War, Extracts from Relevant Legal Instruments, American Society of International Law, 1991 Annual Meeting, 18 April 1991; United Nations, Status of Multilateral Disarmament Agreements: Report of the Secretary General, UN A/45/705, 14 November 1990; Arthur Westing, ed. Environmental Hazards of War: Releasing Dangerous Forces in an Industrialized World (London: Sage (PRIO/UNEP), 1989), pp. 86-92; US Arms Control and Disarmament Agency, Arms Control and Disarmament Agreements: Texts and Histories of Negotiations (Washington, DC: GPO); Durwood Zaelke and James Cameron, "Global Warming and Climate Change -- An Overview of the International Legal Process," The American University Journal of International Law and Policy, Vol. 5, No. 2, Winter 1990.

