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POLLUTION WARFARE--A NEW CHALLENGE FOR
THE COMMANDER

by

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

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

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16 June 1995

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Abstract of

POLLUTION WARFARE--A NEW CHALLENGE FOR THE COMMANDER

During the Persian Gulf War, the United States encountered pollution warfare for the first time. It entailed the intentional release of millions of gallons of oil into the Persian Gulf and the ignition of over five hundred oil wells in Kuwait. This paper examines the effects of pollution warfare on operations during Desert Storm. It also looks at potential forms of pollution warfare that were not used during Desert Shield/Desert Storm. The cost of environmental restoration and its impact on both the strategic and operational level of war are addressed. Finally, recommendations are proposed to limit the effects of pollution warfare.

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CHAPTER I INTRODUCTION

What is pollution, and more importantly, why should the military commander be concerned? According to Webster's Dictionary, pollution is defined as an act that makes or renders something unclean or impure. This act could be accidental, incidental or deliberate. Pollution is almost everywhere on the battlefield. Tanks driving through battlefields emit exhaust fumes into the atmosphere; shell casings litter the area along with discarded equipment, and hazardous items such as depleted uranium rounds, gasoline and oil are left on the battlefield. Pollution is an incidental by-product of waging war. But what if the pollution was deliberately caused by the enemy to terrorize civilians, interfere with an operation, or just to force a commander to alter or rethink his plans?

The commander should be cognizant of the enemy's willingness and ability to intentionally pollute the environment and be able to respond without significantly altering his operations. Since the Vietnam conflict when the United States used various defoliants to deliberately alter the environment during the war, people all over the world have become more conscious of their environment and less tolerant of deliberate acts that violate it.

CHAPTER II ENVIRONMENTAL WEAPONS

The idea of using environmental weapons such as pollution during a war is a relatively new idea. Research into this area has been going on since the 1980's, primarily by the former Soviet Union. Articles about the use of "ecological weapons"

have been appearing in Soviet military texts starting around 1986 (1). In 1989, the Soviets published the book, "Defense Against Weapons of Mass Destruction" which said that it was possible to "make use of destructive forces occurring in nature for military purposes" (2). These destructive forces included "flooding and pollution to disrupt navigation and disable irrigation and other hydro-structures and create obstructions in rivers, canals and other bodies of water" (3). Western military research in this area is very limited due to the public backlash it could create (4).

Iraq's willingness to conduct environmental warfare pre-dates the Gulf War of 1991. During its eight year war with Iran, Iraq tried to undermine Iran's economy. This included attacking an Iranian off-shore oil platform in 1983 (5). This resulted in oil spilling into the gulf for over a year (6). While the attack had little impact on the overall Iran-Iraq War, it did help focus world attention to the environmental consequences of war.

Before the start of the Gulf War in 1991, Saddam Hussein had threatened to sabotage oil fields in Kuwait and elsewhere in the Middle East. These threats were in response to the international sanctions imposed upon Iraq by the United Nations for Iraq's invasion of Kuwait in August 1990. To carry out this threat, the Iraqi military mined the Kuwaiti oil installations shortly after the invasion (7).

On 22 January 1991, only a week after the start of the Gulf War, Iraq set fire to two Kuwaiti oil refineries and to an oil

field near the Kuwait-Saudi Arabia border (8). This event, while small compared to later events, started a new, possibly unintended phase in the conflict--conducting war on the environment with pollution as a weapon. While Hussein's intentions were unknown, the event could have signalled his willingness to carry out his threats to destroy Kuwaiti oil fields if coalition forces were to attack Iraqi troops or to disrupt aerial surveillance of Iraqi troops in Kuwait (9). If intended as a diversion, heavy smoke could affect military operations against Iraq by limiting aerial surveillance by planes and satellites.

Several days later Iraq escalated the environmental war by intentionally pumping crude oil directly into the Persian Gulf from tankers and a petroleum terminal. It was estimated that over eight million barrels (42 gallons per barrel) of crude oil had flowed into the Gulf (10). To put this spill into perspective, the Exxon Valdez accident of 1989, the worst oil spill in United States' history, released only 260,000 barrels of crude oil off the coast of Alaska (11).

The results of this release into the Persian Gulf were varied and many. The most obvious was the oil slick created by this release. It eventually covered over six hundred square miles of sea surface and blackened over three hundred miles of the Kuwaiti and Saudi coast line (12). The effect on the environment was devastating.

The question that should now be asked is why would Iraq take

this step in the war? What could this act accomplish? Iraq may have hoped to prevent an amphibious operation in this region of the gulf. By releasing massive quantities of crude oil into the gulf, the commander must now factor this new event into his battle plans. Equipments' efficiency can be affected by the oil. Vents on the amphibious crafts that carry soldiers onto the beach could be fouled by oil and may require modifications that may be costly and time consuming (13). The commander must also consider the health and safety of his troops conducting the operation under these circumstances. While most modern amphibious assaults are conducted by dropping troops onto the battlefield with helicopters or landing them via LCACs, an amphibious assault can be delayed by hours (maybe even days) if the slick is ignited (14). Oil can be ignited and sustain combustion if the slick is at least one millimeter thick (15). Ignition could be introduced by the enemy, heat or sparks from a hot exhaust on an amphibious vehicle, bombs or other sources (16). The resulting heat and smoke from the flames could also "fool" some of the smart weapons in the commander's arsenal (maverick missiles and the BGU-15 bomb) and hamper or delay an aerial attack (17).

Even without ignition, crude oil can present a health hazard to troops on a beach during an amphibious operation. Since oil spills undergo considerable evaporation, troops can be overcome by the petroleum hydrocarbons released into the air (18). If the enemy is capable of this kind of environmental attack, then the commander has to consider a viable means to minimize this risk.

These could include NBC (Nuclear, Biological or Chemical) clothing or the rapid establishment of some type of decontamination facility in the area.

Besides troop deployment, the commander has to consider ship operations in this environment. While there have been computer simulations, there has been very little real world experience for operating Navy ships in oil slicks. During the Gulf War, it was not known how the oil slick could interfere with ship operations (19).

Aside from delaying a possible amphibious attack by the coalition forces, the oil slick could have presented a serious danger to the desalinization plants in Saudi Arabia if it had reached their intake systems because the separation technology they employ can be fouled by oil residues (20). These desalinization plants provided over ninety per cent of the drinking water to the people in Saudi Arabia and the coalition forces and were essential for electrical production and other industrial plants which powered Saudi Arabia's infrastructure (21). If the oil slick did force the desalinization plants to close, this would have forced the commander to quickly find other ways to make water available for his troops. In the worst case, water would have to be brought in by ship, complicating the logistics chain for the commander. The loss of water could also impact the coalition forces' ability to conduct decontamination operations in the event that Iraq had used chemical weapons (22).

Three days after the Iraqis released the crude into the

gulf, coalition forces bombed the Kuwait oil installations. Under the advice of civilian petroleum engineers, coalition forces blew up the control system that was pumping the oil. This action shifted the flow of oil from the gulf onto the land where it would be easier to clean up at the end of hostilities (23).

Towards the end of the Gulf War, as Iraqi forces retreated from Kuwait, they systematically blew up over five hundred Kuwaiti oil wells (24). The resulting fires, smoke, and oil from these explosions presented more problems for the coalition forces in the region. Not only did the smoke hamper air operations and aerial reconnaissance, but advancing coalition forces marching into Kuwait were "greeted" by clouds filled with soot and other aerial pollutants including carcinogens and sulfur dioxide, the key component of acid rain (25). These fumes, which can cause severe respiratory and throat ailments, coupled with the smoke that encompassed the area, created a severe morale problem for the troops in a relatively short period of time (26). In addition, the heat from burning well-heads threatened to explode gasoline tanks on vehicles as troops drove through the area, forcing them to detour around these areas (27).

These examples show how deliberate pollution can affect a commander's plan or operation in a specific area during a conflict. But pollution is indiscriminate in whom it affects, either directly or indirectly. It affects belligerents and non-belligerents. Pollution is both a short term "weapon" and, more importantly, a long term "weapon". It can spread quickly and

cover a large area, and its effects can last for decades. For example, consider the oil slick released by the Iraqis into the Persian Gulf. Besides the possible threats it posed to Saudi Arabia's desalinization plants and any amphibious operations in that area, it had a devastating effect on marine life in the Persian Gulf. Plankton, which lives near the surface of the sea and is the base of the food chain was almost wiped out in those areas covered by the oil slick. As the oil emulsified with the water and heavier oil products (those that did not evaporate) sank to the bottom of the gulf, coral and other marine life could be smothered (28). One source estimated that approximately twenty-five percent of the Saudi shrimp industry was lost due to the oil slick and that it could take up to four years to recover (29).

The burning oil wells also had a significant non-military impact on the region. Chemicals, soot and oil from the fires coated vegetation and fouled drinking and irrigation waters. This in turn destroyed the food source for grazing animals and almost wiped out this industry. This has been referred to as petroleum poisoning (30).

The bottom line to this chain of events is that the local economy and the civilian population will probably be impacted to a greater degree than military operations and personnel due to the long term effects of pollution. Although the commander's primary responsibility is to the success of his mission and the safety and well-being of his troops, he must consider all the

effects that the war will have not only on his mission and troops, but also on the non-combatants in the area.

The United States' quick victory in the Persian Gulf War showed that Iraq's use of "pollution weapons" had little effect on the war's outcome. Therefore, while it is possible to conclude from this war that "pollution weapons" may have a negligible effect on military operations, it is not possible to disregard their long term effects on the environment, the local populace and economy, after the conflict is concluded. The fact, that "pollution weapons" can have expensive and disastrous long term effects could reduce a nation's will to fight if the enemy threatens to include pollution in their arsenal. A nation may decide that the risks and costs involved with combatting pollution and its effects could outweigh the benefits of continuing the war.

CHAPTER III ENVIRONMENTAL PLANNING FOR FUTURE OPERATIONS

In planning for future conflicts, will it be necessary for the commander to consider the possibility of the "pollution weapon"? Most definitely. There are other countries that also possess or have access to vast quantities of oil that could be used during a conflict. A belligerent does not have to be an oil producing country to wreak environmental havoc on an area. A belligerent could utilize loaded oil tankers in their harbors and either pump the oil into the water or sink the tanker, thereby creating a navigation hazard in addition to the oil spill. Depending on the quantity and types of petroleum products

released into the harbor, this could delay an amphibious landing operation for reasons cited earlier in this paper (ignition, health hazards, etc).

It should be noted that oil is not the only "pollution weapon" available to a belligerent. Many nations possess small nuclear power plants that provide their electrical power. Also, many universities throughout the world have nuclear research and testing facilities associated with their science departments. These power plants and universities could become the source of nuclear pollution if an enemy decided to release radioactive material into the atmosphere. Depending on how the release is conducted, a commander may not realize that his troops could be in or entering a contaminated area as they conduct their operations.

Another way a belligerent could wage an environmental war is by utilizing a factory's emissions to increase the amount of pollutants pumped into the air. If the concentration of pollutants (such as sulfur dioxide) is high enough, this could present a serious health hazard to friendly forces. To illustrate the power of air pollution, in December 1952, a heavy fog coupled with a high concentration of sulfur dioxide from factory emissions turned the air in London, England into an almost poisonous gas. This lasted for about five days. Over 6000 people died within a month due to exposure to the polluted air (31). While the weather conditions vary from region to region and day to day and may not be suitable for creating this

type of pollution weapon, it may be possible for a factory engineer to "rig" the equipment in such a way that smoke stack emissions could settle down to the ground vice being pumped higher up into the air where it could be dispersed with little or no effect on friendly forces. Such events could force a commander to either alter his plans or have to destroy the sources of pollution. This would be a hard decision for a commander. As General Norman Schwarzkopf said during the Persian Gulf War, "We are not in the business of destroying Kuwait while we are liberating Kuwait."(32).

What makes the belligerent's use of pollution as a weapon frustrating for the commander is the difficulty and cost of fighting it. Take for example the oil slick created by Iraqi forces during the Persian Gulf War. Coalition forces denounced this release of oil into the gulf as an act of desperation, which would not alter their war plans. They also conceded, however, that they could not start any type of clean up procedures in the area since the spill was initiated in a war zone and not enough spill fighting equipment was available to "combat" that size of a spill (33).

In fact, over a year after hostilities ceased, various clean-up operations were still being conducted in the Persian Gulf with limited success. Oil was still floating around the gulf and "lakes" of oil from the burning oil wells still dotted the Kuwaiti countryside. It was not until November 1991 that the last burning oil well was finally extinguished and capped (34).

The cost for the ongoing environmental restoration of Kuwait alone was estimated to be over 20 billion dollars, a figure that was not included in the conflict's "total" cost (35).

This conflict took place in the oil producing countries of the Middle East, which have the resources and finances to pay for their own environmental clean-up without funding assistance from the United States. But, looking at the recent Haitian operation, what if the junta decided to empty their oil tanks into the harbor at Port-au-Prince with the idea of delaying an amphibious operation? While this release would not affect an amphibious operation, the eventual environmental clean-up would drive up the cost of the war significantly. Although Haiti may have initiated the environmental damage, it is not a wealthy country and the costs of any environmental clean-up may have to be absorbed by the United States and, in particular, the military since it is already on-site and funded for war-related activities. As a result, the "pollution weapon" can make war a lot more expensive for nations to wage. The issue of pollution now becomes a strategic decision for the national command authorities. Nations may now have to decide if an operation is worth the risk due to the costs involved with an environmental clean-up. If the national command authorities decide that the operation is essential, the commander may now be responsible for conducting his operations in such a way that the effects of a pollution release are minimized along with the associated clean-up costs.

This now leads to the final question: What can the

commander do in the future if he can not prevent a belligerent from using pollution as a weapon? The first thing he should do is plan for the possibility of various types of pollution releases by the enemy and how to minimize the pollution's impact on his forces and the environment. This could be part of an environmental annex to his operational and contingency plans. Prior to the Persian Gulf War, the United States conducted two studies that accurately assessed the environmental consequences of a war in that region but minimized their importance because of a concern that war preparations could be hampered (36). As a result, when the Iraqis released the oil into the gulf, there was not enough spill clean-up equipment in the region to prevent its spread and eventual damage.

Part of this planning effort for pollution releases should entail increased coordination and liaison with the various government agencies assigned to regulate pollution control in the United States and abroad. These include the United States Coast Guard, the United States Environmental Protection Agency, and the United States Department of Transportation. Although they have no jurisdiction overseas, they should be able to advise the commander on the best procedures for minimizing the impact of a pollution release in an area and what resources are available in the United States for a clean-up operation.

The commander should also touch base with the members of his coalition force and other allies to determine what pollution fighting assets they may have available. After determining what

is available, he should try to bring a portion of these assets into the area in the event they may be required. Other assets could be brought as needed. While personnel, food, ammunition, water and other direct war-related materials would take priority over pollution cleaning material, time is of the essence in trying to contain and minimize the effects of a pollution release. If the equipment is not in the area ready for use, then the environmental clean-up costs will increase significantly as the damage spreads.

The commander should also consider increasing his "pollution fighting" capabilities before hostilities break out. This could include increased training for construction battalion personnel in environmental clean-ups and repairs to oil pipelines, etc. in hostile environments. Medical personnel would also be able to advise the commander of the possible health hazards that various pollutants pose to troops and the latest methods to reduce exposure to the pollutants. Finally, the commander could call upon private industry (chemical, petroleum, etc.) to advise him about the most effective methods for containing pollution. With this information, the commander can make (or alter) his plans so that he can maintain his momentum. By doing these things during the planning phase, it should be easier for the commander to minimize the effects of a pollution release on his troops, protect the civilians and the environment, and to control the total costs of the war.

IV CONCLUSION

The Persian Gulf War introduced the United States to a new weapon available to almost any belligerent--pollution. Pollution can make the high density environment of littoral warfare even more complicated than a commander expected. It also poses unique problems beyond those that usually face a commander when he is formulating his battle plans. Its effects can be devastating and last for years and require a massive clean-up effort in order to return countries, even entire regions, back to normal. The costs of these clean-ups in today's environmentally conscious world could equal or exceed the cost of the war itself. As a result, the commander should ensure that any future operational plans include pollution and environmental warfare because future enemies are likely to try them again.

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