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IRAQ'S ECONOMIC AND MILITARY VULNERABILITIES

How Vulnerable Is Iraq's Economy?

By Patrick Clawson

"Will sanctions against Iraq work?," is a question too ambiguous to be useful. It leaves unasked such key problems as: What do we want sanctions to accomplish? How would Iraq react if sanctions started to pinch? How much does Saddam Hussein care about what happens to Iraq's economy?

The reality is that a sanction-induced economic crisis cannot be counted on to force Saddam Hussein out of Kuwait, much less out of office. Sanctions are too unsure to hit the target for them to be the sole arrow in the U.S. quiver. Iraq has good prospects of surviving sanctions through the end of 1991 by a combination of tightening consumers' belts plus loosening the socialist tourniquet now tied around the Iraqi private sector.

What Are Saddam Hussein's Economic Goals?

Saddam's claims about Iraq's financial plight have received an all-too-receptive ear from many Western observers.[1] Before the invasion, his basic argument was that Kuwaiti overproduction of oil caused an acute crisis for the Iraqi

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How Vulnerable is Iraq's Military?

By W. Seth Carus

Should diplomacy fail, the United States may be forced to fight a major war with Iraq to free Kuwait and to provide for the long-term security of Saudi Arabia and other allies in the region.

If war breaks out, Iraq would be faced by a coalition of loosely allied military forces. Although the United States is contributing the largest and most powerful military contingent, it will be supplemented by units of varying degrees of importance from a large number of other countries. In addition to the Saudi armed forces, Argentina, Bangladesh, Canada, Egypt, France, Morocco, Pakistan, Syria, and the United Kingdom have agreed to send combat formations. Some of these forces may be of military significance, while others are of political importance only.

The following analysis will not examine the political context surrounding the outbreak of hostilities. Nor will any attempt be made to consider morale as a factor, even though it may be decisive in determining the outcome of the conflict. Iraq almost certainly would be sub-

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"ECONOMY" *(from page 1)*

economy, already suffering from the heavy debt incurred to defend the Arab cause during the Iran-Iraq war. To this he added some last-minute claims that Kuwait had been pumping Iraqi oil from a field along the border. The implication was that the Iraq-Kuwait dispute was economic, leading some to speculate that Iraq might leave Kuwait if an attractive financial package could be assembled. In fact, Iraq's claims against Kuwait are without foundation. They are being used to mask the fundamental failure of the socialist economics applied by the ruling Ba'thist party.

Contrary to Iraq's claim that it faced an economic crisis, Iraq's economic situation was better in 1990 than it had been for some years. Iraq was able to pay $3.4 billion in debt service during the first three months of 1990, more than it paid in all of 1989 and much more than anyone expected. In 1990, Iraq has paid more on its debt than either Brazil or Argentina did on their much larger debts. In addition, Iraq boosted its allocations for civilian imports by $1.4 billion, or 16 percent, in July — not exactly the action of a country with an empty wallet. Furthermore, despite Saddam's complaints about loss of oil revenue, Iraq's oil income was steadily rising. In 1989, oil earnings were 70 percent higher than in 1986. Even under a pessimistic price scenario, Iraq's 1990 oil earnings would have equalled the 1989 level, thanks to higher output. Iraq's economic problems are systemic and long term, not a short-term crisis caused by temporary Kuwaiti high oil production.

Iraqi spokesmen like to blame their long-term economic predicament on the country's heavy debt, which is quite misleading. Iraq's debt burden is not that large, if the debts to Arab states are excluded — debts that no one expects Iraq to repay.[2] The standard measure of a debt burden is the ratio of debt to exports. Before the invasion, Iraq's real debt was no more than $40 billion; the numbers are imprecise because we do not know about all its unpaid interest and short-term debt. Iraq's annual exports were $15 billion, including non-oil goods ($.5 billion) and services ($1 billion). The debt-to-exports ratio was therefore 2.7. That is far below the level for heavily indebted Third World nations. Mexico's debt is five times its annual exports; Argentina's, nine times. Other Middle Eastern nations have a higher proportional debt burden than Iraq: Turkey manages nicely with a debt four times exports, while Egypt stumbles along with a debt ten times exports — almost four times heavier than Iraq's burden.

Iraq's fundamental economic burden is bad government policy that wastes available resources. In other words, Iraq's problem has not been poverty but profligacy. Part of that profligacy has been a massive military machine. Contrast Iraq and Kuwait. Saddam spent $50 billion during the 1980s just on arms imports.[3] During that same decade, the Kuwaiti government invested $50 billion in its reserve funds. The result by 1990: Iraq had 100,000-150,000 dead on the battlefield, while Kuwait had an investment portfolio that had increased in value to $100 billion.

The legacy of the war with Iran is not the only reason for Iraq's current economic plight. The Ba'thist economic policy has done much to keep the country poor. For 25 years, Iraq has followed the classic Stalinist approach. One element has been extraordinarily detailed controls over the economy, down to official prices for vegetables. Saddam's "liberalization" program announced with great fanfare in 1988 did little to change the pervasive state presence. As a measure of Iraq's repressiveness, one of the liberalization steps was to drop the requirement for a secret police license for each individual typewriter. A second element of Iraq's classic Stalinism has been a love of gigantic projects, such as the transformation of Baghdad in the early 1980s in preparation for the Non-Aligned Summit, which was then had to be transferred from Iraq because of the war. Saddam has a Nebuchanezzer complex:

he wants to build vast monuments to his glory.

The real economic factor behind the invasion is that Saddam Hussein, unwilling to abandon Stalinist policies, has been unable to deliver on the public expectation that the cease-fire with Iran would bring prosperity. Saddam's only strategy for growth has been to order more and more huge projects. Under his orders, Iraq's technocrats have prepared detailed plans for $30-50 billion of white elephants: a Baghdad subway station, Mosul airport, 3,000 km of railways, six-lane expressways to Turkey and Jordan, two large dams (Madawa and Badush), an 1800-MW power station (Al-Anbar), an oil refinery (near Baghdad), a 1-2 million ton iron and steel complex, a 200,000-ton aluminum smelter, a factory to make 1 million tires per year, plus the Petrochemical Plant No 2 which has gained notoriety for its chemical war capabilities.

These plans were far beyond the country's financial capacity unless phased over twenty years. To be sure, Iraq could afford to carry out some of these projects over the next five years but could not begin to afford the package as a whole. Unable to set priorities, Saddam had insisted on pressing ahead on every front simultaneously, much as he demanded developing simultaneously a broad range of sophisticated weapons. So many resources were wasted that many projects were left incomplete. More importantly, so many resources were channelled into large-scale projects that few resources were left for the small-scale investment much more vital to growth.

Saddam's love for gigantic projects left him unsatisfied with the limited earnings he could expect from Iraq's oil industry. The many billions of ongoing revenue needed could only be obtained by grabbing some additional oil fields. The mere $2.4 billion one-time payment that his ministers talked about in late July, as compensation for oil Kuwait was alleged to have pumped from an oil field overlapping the Kuwait-Iraq border, would have been of little use.[4] Iraq was after grand larceny, not petty theft, and its economic program suggests that any retreat from Kuwait will be tactical, not strategic.

The historical record indicates that if Saddam had every penny of Kuwait's revenues, he would have wasted the money on inappropriate large-scale civilian development projects or spent it on importing weapons and building an arms industry. The Iraq-Kuwait conflict is a clash between competent and incompetent, not between haves and have-nots. Nevertheless, this analysis does suggest where Saddam is vulnerable to economic sanctions — they can puncture his dreams of greed and grandeur.

What Can Sanctions Accomplish?

Let us assume that all governments in the area cooperate with the sanctions, which is the best possible case. Nevertheless, sanctions could not inflict great pain on the Iraqi economy within a few months. Nor can we be sure that Iraq's response to sanction-induced pain will be to seek compromise: if wounded, Saddam may lash out again. Sanctions are not a sure way to get Saddam to retreat.

Sanctions Will Not Stop All Trade

Smuggling is sure to proceed, no matter what the attitude of governments. International commerce is done by traders, not by governments, and some businessmen will be eager to make a profit from by-passing government rules. The Iranian, Syrian and Turkish borders are hard to police because there are nearby population centers. The Iranian and Syrian borders are relatively easy to cross because there are many back roads and tracks. Smuggling is even easier than it is across the porous U.S.-Mexico border. The Jordanian case is quite different: the only reason to drive along the long road in the desert is to get to Iraq.

The real constraint on smuggling will eventually become Iraq's ability to pay. The Iraqi gov-

ernment could certainly mobilize $2 billion from the $1 billion it took in liquid assets from Kuwaiti banks, from friendly governments (like Libya) and from loans from crooked banks. That should provide at least a year's worth of vital spare parts for the military and industry.

The money for food smuggling could come from the private sector. If children are in danger of starving, their parents will sell the family silver. In the Iraqi and Kuwaiti context, citizens have two main ways to raise hard currency to pay smugglers: private gold stocks, of at least 5 million ounces ($1.5 billion), and the foreign bank accounts of Kuwaitis. Desperate parents can be counted on to exercise great creativity to bypass the assets freeze. With this money, Iraq could last many months if consumption is kept at a low level. Assuming a 100 percent mark-up over normal prices, $1 billion would pay for the goods needed to sustain the skimpy allocations under the official rationing system through December 1991.

Sanctions Will Not Starve Saddam Out of Kuwait

Neither the world community nor the United States have the stomach for starvation as a tool of policy. The U.S. government, and even more forcefully U.S. religious and civic leaders, have consistently criticized those who use starvation as a tactic in war, be it in Eritrea, southern Sudan, or Cambodia. There is no point, then, to the question, "Can we starve out Saddam Hussein?" The relevant questions is instead, "Can we force Saddam to accede to conditions he finds humiliating before Iraq receives humanitarian aid?"

Humanitarian aid would be a last resort for a proud Iraq. Saddam's advisors may urge him to use the issue of humanitarian aid as a political tool with which to split the world alliance against him. However, he would not want actually to depend on such aid for Iraq's vital food supplies.

Iraq can make do for months without humanitarian food aid. Until the June 1991 harvest, Iraq can survive at the current ration levels, thanks to food stocks and minor smuggling. The table on food balances (see Table One) shows (1) the level of stocks in July 1990, based on data from the U.S. Agricultural Attache in Baghdad; (2) the domestic output from the just-completed harvest (or, for rice, the harvest to start soon); and (3) the amount needed in light of the ration levels announced on September 1. The fourth column then calculates what level of smuggling per month is required to fulfill the ration through May 1991, when the next harvest would start. For all foodstuffs together, the total amount of smuggling needed is 26,000 tons per month. That is less than 900 tons per day. It is hard to imagine a blockade so thorough that it cannot be crossed daily by some combination of eighteen 50-ton trucks, nine 100-ton dhows, or thirty 30-ton airplanes. Furthermore, these estimates exclude the initial stocks of households, which could considerably reduce the smuggling need.

Iraq could make do at least through the end of 1991 without international food aid. While much attention has been given to Iraq's dependence on food imports, few have asked why a country with such rich agricultural resources is so reliant on food imports. Ba'thist Iraq has had one of the three or four worst agricultural records in the world. The problem has been bad government policies, designed to keep food cheap in Baghdad at the expense of the farmers. Cereal output was higher 33 years ago, before the 1958 land reform, than in 1990.[5]

Saddam has shown that he is prepared to be flexible on farm policy when necessary, i.e., when cash runs short. Three times in the last twenty five years (1968, 1972 and 1985), cereal output has doubled in one year compared to the next. He knows what has to be done and he is doing it now: increasing prices paid to farmers (40 percent on average for 1990/91), providing inputs at low cost, and turning a blind eye to farmers who go around the official marketing channels. Iraq has demonstrated that it has

breath-taking potential to increase food output. To be sure, Saddam cannot count on a huge harvest, for that depends upon good weather, decent relations with the Kurds in whose area much of the food grows,[6] and a reasonable supply of labor and other inputs.[7] But neither can the UN alliance count on Iraq running short of cereals. A repeat of the 1985 growth performance would leave Baghdad with plenty of food to get through 1991.[8] The basic point is that sanctions cannot be counted on to produce a sure result.

Sanctions Will Weaken Iraq

They can be counted on, however, to produce a substantial drop in the Iraqi standard of living. This was not evident in the first two or three months. Iraqis have benefited from the looting of Kuwait, which has led to a tremendous increase in the stock of consumer durables — 50,000 automobiles alone! Those lucky enough to steal in Kuwait obviously have done well, but so has the ordinary Baghdad consumer. The streets are said to be full of vendors of goods from Kuwait, goods of a quality and profusion not seen in Baghdad since before the 1980-88 war if even then. In addition, some of the foreign refugees fleeing Kuwait are selling their possessions at bargain prices to raise money for the trip home.

But over time, the drop in food availability and the rise in food prices will outweigh the initial gain. Food rationing may prevent the obvious signs of shortages but the effect is the same: less food on the table.

The sanctions have already caused spot food shortages. The situation will get worse, as merchants and households run out of the goods on hand at the time of the invasion. Before the crisis, Iraq imported 70 percent of its citizens' diet: 2,200 calories out of 3,100 calories (see Table Two). The ration announced September 1 is sufficient to provide 1,270 calories (see Table Three). Meanwhile, domestic production of non-rationed goods can add another 490 calories per day.[9] That means Iraqis would have only 1,760 calories per day, which is 57 percent of their pre-crisis diet. A diet of below 2,000 calories a day would put Iraq down with the poorest nations on earth, like Bangladesh, and below the World War II level in Britain.

Sanctions will hit industry as well as food. However, Iraq's industries are not that vital to the economy. Industry is less than 10 percent of GNP and most products are not vital in the short-term, e.g., building materials and kitchen appliances. The industries which must concern the Iraqi government are those in which any shut-down is felt immediately by consumers. Three principal industries fit this bill. First are the oil refineries, without which Iraq's transport system would come to a halt in weeks.[10] Second are the dozen major electricity generating plants, without which industry will have to come to a screeching halt and food distribution will be complicated by a loss of refrigeration. Third and perhaps most sensitive are the water pumping/filtration stations in Baghdad, without which the city's population would be forced to spend many hours a day finding and purifying water.

Iraqi industry will slowly grind to a halt under the embargo. But the effects will be slow, because most businesses have inventories and can cannibalize the excess capacitity in their factories for spare parts. There are sure to be problems in adjusting to the loss of foreign experts and easy access to spare parts, but new channels will be found that will keep much of industry operating at even lower than normal capacity. Businessmen throughout the area are leaping at the opportunity to replace long-time parts suppliers. Shortages will grow more common, but Iraqi consumers are used to shortages; they can postpone most purchases or find local substitutes.

Another sector that will feel the sanctions is the military. At first, Iraq will be able to cannibalize its large equipment inventories and draw

upon its own production capacities, especially for ammunition.[11] But Iraq will soon run short on cash for sophisticated inputs and parts. Before the crisis, Baghdad was spending about $1 billion a year on such imports, plus billions more on weapons and infrastructure which will now be postponed. Spending at this level for parts and inputs cannot be sustained. In any case, prices will go up and suppliers will be hard to find, especially for airplane parts. After many months, as sophisticated equipment deteriorates, Iraq will be less able to fight, at least with planes and tanks. That alone would justify the sanctions as a useful contribution to resolving the crisis, for the sanctions make Saddam less confident that he can fend off an attack. Furthermore, if military action is needed, the sanctions could shorten the war by reducing Iraq's capabilities.

Sanctions May Not Force A Compromise

In sum, the medium-term future for Iraq's economy is bleak. The sanctions will leave Iraq weak and poor as long as the blockade on the oil pipelines and ports can be sustained.[12] The best Saddam can hope for is to postpone the inevitable for three to five years, unless the U.S. loses its will. He would do well to learn a lesson from Iran, which saw its economy gradually decay during the six years of stubborn refusal to make peace on much the same terms it finally achieved.[13] If Iraq is going to leave Kuwait eventually — and the large-scale looting might suggest that Iraq does not count on staying long — then what is to be gained by delaying the departure until Iraq is bled dry?

If this question begins to weigh on Saddam Hussein's mind, he may decide to seek a compromise solution — exchanging Iraqi withdrawal from Kuwait for a lifting of the embargo and territorial and financial concessions. It is clear already that the prospects for the Iraqi economy are desperate. Neither Saddam, those who might overthrow him, nor the man in the street, however, will necessarily react to these prospects as long as the day-to-day situation seems manageable.

The combination of food shortages plus diminishing prospects for an outcome favorable to Saddam must lead some Iraqis to ask what is the purpose of the sacrifice. But food shortages do not necessarily lead to popular discontent if the population supports the government in what is accepted to be a national emergency. Psychologically, the sanctions may not stimulate action, because the effect on Iraq will be a long, slow decline in which each day seems only marginally different from the day before. There may be no dramatic moments that would move people to action.

The Bush administration assumes that Saddam will seek a compromise when the sanctions start to hurt Iraq's economy. But it is not clear that he would abandon his path if economic problems became severe. In the past, Saddam Hussein has usually faced adversity with tactical retreats only, not abandoning his goals. Consider the 1975 Algiers Treaty with Iran, which allowed him to end the Kurdish threat while only postponing for five years his drive for control over the Shatt al-Arab. That precedent suggests caution before agreeing to any retreat from Kuwait. The United States and its allies would need some assurances that he would not lick his wounds, prepare his nuclear missiles, and try again in a few years.

It would also be prudent to plan for the possibility that Saddam's reactions to a sanctions-induced crisis would be to hit back. He has shown an ability to be daring and bold. Unfortunately, Saddam could find some unexpected way to attack Western interests. The United States has focused heavily on preventing an invasion of Saudi Arabia. He may find another option.

The Tragedy of Iraq's Economy

Iraq's economy has great potential. Its re-

sources are excellent: rich agricultural land; extensive and well-trained manpower; the world's second largest oil reserves.[14]

Despite these many advantages, Iraq has remained a poor country compared to its neighbors in the Gulf Cooperation Council. The tragedy of the Iraqi economy is that such a potentially rich nation has been cursed with such a bad government. The Ba'th Party and especially Saddam Hussein have pursued disastrous economic policies. bleeding the country to feed the military machine. Iraq's oil income per capita is already above that of two Gulf Cooperation Council nations (Bahrain and Oman); it could have been close to Saudi levels if Iraq had not taken an isolationist and confrontational approach to the oil industry.

Neither Saddam nor his predecessors have been willing to sacrifice the political ambitions they hold sacred for economic gain. It would be imprudent to assume that Saddam will change course and suddenly give priority to economics over politics. The historical record suggests that Saddam will not be easily deterred by economic problems. Perhaps sanctions will cause Saddam to seek a compromise, but perhaps not. The United States should certainly keep its powder dry so that it can have a ready alternative to sanctions.

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TABLE ONE

Iraq plus Kuwait Food Balance, Post-Invasion
(thousand tons per month)

	Stocks July 1990	Domestic Output	Needed for Ration	Smuggling Needed Through May 1991	June 91-Dec 91
Rice	110	166	35	8	35
Flour	422	660	117	0	23
Oil	50	10	12	6	10
Sugar	100	10	23	12	22
Total	—	—	187	26	90

Source: Author's estimate based primarily on Economic Research Service, U.S. Department of Agriculture; plus Iraq, *Annual Abstract of Statistics 1988*; also U.S. Agricultural Attache Baghdad July 12, 1990 report and *FAO Yearbook 1988*.

Notes: Flour is 80% wheat, 20% barley.
Flour assumes 34% waste in milling wheat and barley.
No sugar is assumed to be available from dates.
Stocks are net of seed requirements.
Needs are calculated from the ration times the population, plus 20% for the elite's extra rations and the inefficiencies of the rationing system.

TABLE TWO

Iraq: Food Balance, Pre-Crisis
(calories per person per day)

	Total	Imported	Domestic
Cereals	1627	1292	335
Vegetables & fruit	416	31	385
Oil & sugar	685	667	18
Meat, dairy, fish	436	226	210
TOTAL	3165	2217	948
Percent	*100*	*70*	*30*

Source: Author's estimate based primarily on Economic Research Service, U.S. Department of Agriculture; plus Iraq, *Annual Abstract of Statistics* 1988; also U.S. Agricultural Attache Baghdad July 12, 1990 report; and *FAO Yearbook 1988.*

TABLE THREE

Iraq and Kuwait: Food Balance, Post-Invasion
(calories per person per day)

	Ration as of Sept 1	Non-rationed Domestic Output
Cereals	1018	—
Vegetables, fruit	—	385
Oil and sugar	250	—
Meat, dairy, fish	—	103
TOTAL	1268	488

Source: Author's estimate based primarily on Economic Research Service, U.S. Department of Agriculture plus Iraq, *Annual Abstract of Statistics 1988*; also U.S. Agricultural Attache Baghdad July 12, 1990 report and *FAO Yearbook 1988.*

Note: Kuwait's agricultural output post-crisis is assumed to be zero.
Ration per month is 6 kg flour, 1.5 rice, 1 sugar, .5 oil.

NOTES

1. For instance, Zbigniew Brzezinski advocated, in *The New York Times* of October 7, 1990, the adjudication of "the Iraqi financial claims (not all of which are unfounded)."

2. For instance, Kuwait's Foreign Minister stated in an interview that Kuwait offered in late July to forgive all of Iraq's debt (*Middle East Economic Digest*, August 31, 1990).

3. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers 1988*, reports arms imports of $43.2 billion from 1980-1987. I estimate imports in 1988 and 1989 at around $7 billion.

4. Iraq could have had that much extra revenue and more from the Rumaillah field thirty years ago. The field sat unexploited from the mid-1950s until the early 1970s, because Iraq would not compromise with the international oil companies. Anyone hoping for Iraqi concessions in the face of low income would do well to study the history of Iraq's oil industry. Each major development came after literally decades of tough Iraqi demands, on which Iraq did not compromise despite a dire need for cash.

5. To remove the effects of weather variations, multi-year averages were calculated. In 1953-57, cereal output averaged 2.15 million tons, while the 1987-90 harvest averaged 1.95 million tons.

6. Even if the government eschews coercion and follows the more effective policy of allowing prices to rise, the Kurds and the Baghdad merchants will have problems establishing the transportation, distribution and marketing networks to handle perishable foodstuffs.

7. The labor market may be disturbed by the departure of Egyptians. However, policies that permit more rational use of labor would overcome any shortages. After all, output was higher in 1958 when the labor force in agriculture was roughly half its current size (1 million compared to 2 million). As for fertilizer, Iraq is largely self-sufficient, now that its war-damaged plants are mostly repaired.

8. Iraq will certainly not be able to produce the sugar and cooking oil it needs. These commodities would be the most important to smuggle, both because they will be in short supply and because they are the foodstuffs with the highest ratio of calories per kilo.

9. The domestic production of chickens will effectively cease without the imported feed. The figures have been adjusted accordingly.

10. The volume is so vast (40,000 tons, or 300,000 barrels per day) it could not possibly be trucked in.

11. Iraq claims to have large-scale ammunition production capability, but Iraq will have to import inputs for explosives, fuses, metal casings, etc.

12. It is technically easy to blockade the three major avenues Iraq has used to date for oil exports: one Turkish port, one Saudi port and Iraq's own port. Kuwait adds one port to the list. The main alternative avenue for Iraq would be to export via a pipeline to Iran. In the unlikely event that Iran agreed to any large-scale trade with Iraq, the embargo could be easily extended to Iranian oil shipments. Iran has only one oil port of any size.

13. While Iraq was the initial aggressor in the Iran-Iraq war, the Iranians crossed into Iraqi territory in the summer of 1982 and remained unwilling to return to the status quo ante until finally accepting the inevitable in the summer of 1988.

14. Reserve figures have been manipulated by many countries in the region (especially Iran) as part of the bid to get large OPEC quotas, but Iraq's reserves are certainly as high as the 100 billion barrels claimed. Given world reserves of just under one trillion barrels, Iraq has 10% of the world's total and Kuwait an additional 9.5%.

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jected to an intense strategic bombing campaign of a type never previously witnessed in the Middle East. It is difficult to estimate how the government, army and people of Iraq might react to such attacks.

If Iraq's leaders and soldiers lose the will to fight as a result of the military operations conducted against them, it may be possible to defeat Iraq with little difficulty. Should morale remain steadfast, however, forcing Iraq to accept defeat may prove to be a lengthy, costly process.

Similarly, Iraqi combat forces almost certainly would have to adapt to conducting operations in a situation where adversary forces have complete air superiority. If the Iraqi army is unable to cope with the pressures caused by constant air attacks, units could collapse. But if the Iraqi army is able to emulate the German army of World War II, which operated effectively despite total Allied air superiority, it may be able to continue operations.

The capabilities of the Iraqi military are often underestimated by those who focus excessive attention on the first years of the Iran-Iraq war. During the final years of the war, Iraq demonstrated operational capabilities not previously evident. The Iraqi military does have problems, but it also has many strengths. The following is an assessment of some of its strengths and weaknesses.[1]

Unconventional Warfare

Iraq has a substantial unconventional warfare program, involving the development of biological, chemical and nuclear weapons. Current reports suggest that Iraq is capable of employing both biological and chemical agents, but that it will be at least two years before it has nuclear weapons.

According to press reports, Iraq worked actively to develop biological weapons for several years. Until recently, however, there were no indications that the Iraqis had produced such weapons.[2] It was known that Iraq was obtaining potential biological agents, and was taking steps to acquire research and development and production facilities. It now appears that at least some U.S. officials believe that Iraq is making the transition to production of weapons. Judge William H. Webster, director of the Central Intelligence Agency, stated on September 18, 1990 that "Iraq has a sizable stockpile of chemical and biological weapons."[3] Congressman Les Aspin, chairman of the House Armed Services Committee, subsequently added that Iraq "is expected to have a militarily significant biological program by the end of this year or early next year." According to press reports, Iraq now possesses munitions "that can disperse respiratory anthrax," apparently in aerosol form.[4]

The military significance of these capabilities is unclear. Prior efforts to employ biological weapons during the Second World War were less than impressive. Past experience, however, provides no accurate guide, because improvements in dispersion systems for biological agents have radically enhanced the potential effectiveness of such weapons. In theory, an effectively designed biological weapon could kill large numbers of people. Ineptly handled, however, the same weapons could be useless. In the absence of more precise information on the character of the Iraqi weapons, and the manner in which they would be employed, there is no way to estimate the likely impact of these weapons.

Iraq also possesses substantial stocks of chemical weapons. U.S. officials believe that Iraq employed "several thousand tons of chemical agents" against the Iranians and Kurds in the 1980s.[5] This included attacks on both military and civilian targets. According to Iranian estimates, 50,000 people were killed or injured by Iraqi use of chemical agents during the Gulf War, but this does not include casualties from attacks on Iraqi Kurds after the end of the

fighting.

The available evidence suggests that Iraq is capable of delivering the chemical agents using aircraft bombs, short-range rocket artillery, and artillery shells. Iraq also may have a chemical warhead for its 90-kilometer range Laith rocket, which is an extended-range version of the Soviet FROG-7. Recent reports also suggest that Iraq may have developed a chemical warhead for its ballistic missiles.

Iraq appears to have used mainly mustard gas and nerve agents, but probably also employed other agents as well. Unconfirmed rumors have suggested that Iraq may have some chemical agents capable of penetrating gas masks and protective suits. These weapons were not decisive in the war with Iran, and there is no reason to believe that they will be more effective on the military forces arrayed against Iraq. Nevertheless, Iraq's chemical capabilities will pose problems for opposing military forces and are capable of causing casualties and of disrupting operations.

Iraq possesses a large inventory of ballistic missiles. Existing missiles are reported to include the Soviet Scud-B, the Al-Hussein, and the Al-Abbas. It appears, however, that the main system now in service is the Al-Hussein, which carries a 180-kg warhead to a range of 600 kilometers. There is no clear evidence that the Scud-B is still in service or that the Al-Abbas ever was produced in quantity.[6]

Iraq claims to have a new missile, the Al Hajira. Nothing is known of this system, and it is possible that it is merely a new name for an old missile. Nevertheless, there is reason to worry that Iraq may possess missiles more capable than those used in the closing stages of the Gulf War. According to one report, some of Iraq's Waleed missile launchers have been fitted with equipment to handle liquid oxygen.[7] This would suggest that Iraq has a successor missile using a cryogenic rocket motor. Use of liquid oxygen would significantly increase the thrust of the rocket motor, either extending the range of the missile or allowing it to carry a heavier warhead.

During the Gulf War, Iraq armed its missiles with conventional high-explosive warheads. There is evidence, however, that Iraq is capable of developing more lethal warheads. It has produced warheads fitted with cluster bomblets and small mines for its short-range artillery rockets. In addition, it is reported to have developed a cluster bomb warhead for its Soviet-supplied FROG-7 rockets, as well as the Iraqi-made Laith derivatives. Iraq is reported to have obtained technology from Germany needed to produce missile-delivered fuel air explosives.[8] In addition, Iraq may possess chemical warheads for some of its missiles.

Chemical weapons on those warheads would have little military utility. The types of missiles available to Iraq, even if improved, are capable only of attacking area targets. Thus, they can inflict damage only on large facilities, such as supply dumps. Even then, losses can be minimized through use of passive defenses. It will not be possible for the missiles to do enough damage to oil installations to reduce exports significantly from Saudi Arabia.

The most important impact of the missiles and unconventional weapons will be political and psychological. The missiles are the only weapons with a high probability of penetrating air defenses. The United States has deployed some Patriot missiles to Saudi Arabia capable of intercepting ballistic missiles, but such weapons provide only partial protection. As a result, they provide Iraq with the ability to inflict at least some physical damage on its opponents with political and diplomatic consequences far greater than the actual destruction.

The Air Theater

Iraq will have major problems in the air, because it cannot defend its own air space against

penetrating allied attack aircraft. As a result, it will not be able to prevent a massive bombing campaign aimed at strategic targets throughout the country. At the same time, its air force will not be able to operate effectively against allied forces. The air defenses and interceptors protecting Saudi Arabia are far superior to those available to the Iranians.

Iraqi air defenses are adequate at best. It has an integrated command and control system supported by a substantial network of Soviet and French early-warning radars, including some mounted on Soviet Il-76 transport aircraft. This system controls the operation of an estimated 225 fighter aircraft and 650 to 750 surface-to-air missile (SAM) launchers.

It should be noted that Iraq is undoubtedly aware of its potential vulnerability to air attack. According to one source, during the Gulf War Iraq built earthen berms in rear areas to protect critical targets from air attacks, and deployed massive numbers of anti-aircraft guns to reduce the danger from low altitude attacks.[9]

Fighter aircraft

The inventory of fighter aircraft is a heterogeneous mix of about 225 to 275 French, Soviet and Chinese aircraft. This includes 150 Soviet MiG-21 and Chinese F-7B fighters, relatively antiquated systems that are substantially less maneuverable than more modern fighters. These old aircraft lack the powerful engines and capable radars standard in newer fighters. As a result, Iraq has only 75 to 125 good quality air defense aircraft.

The best aircraft are 30 French Mirage F-1EQ fighter-bombers assigned to fighter squadrons. These aircraft are equipped with the Cyrano IV radar, which can detect aircraft at ranges of up to about 50 kilometers. They are armed with R.550 Magic dog-fighting missiles and Super 530F radar-guided missiles. In addition, Iraq has 64 Mirage F-1EQs assigned to ground attack squadrons that could be used for air-to-air missions if necessary. Some of the ground attack Mirages are not equipped with a radar capable of tracking aircraft, which would place them at a severe disadvantage against a modern fighter.

Although the Mirage F-1EQ is probably Iraq's best all-round fighter, it is inferior to the fighters available to the opposing air forces. The British and Saudi Tornadoes, the U.S. and Saudi F-15s, the U.S. F-16s, and the U.S. and Canadian F-18s all possess superior capabilities. Even the French Air Force now relies on the Mirage 2000 as its first-line fighter, which it began to receive in 1983.

Iraq may have as many as 48 Soviet MiG-29 fighters.[10] The MiG-29 fighter is a modern high quality system considered comparable in many respects to the U.S. F-15 fighter. According to some reports, the versions supplied by the Soviet Union prior to 1988 did not provide Iraq with aircraft fitted with the standard look-down, shoot-down radar. It is possible, however, that planes delivered more recently may be better equipped. However, the Iraqis are reported to have found the plane difficult to maintain. As a result, it is probably **operationally** inferior to the Mirage F-1.

Finally, Iraq has about 25 Soviet MiG-25 interceptors. The MiG-25 is a high altitude interceptor probably best suited to detecting and attacking large, non-maneuvering targets like B-52 bombers. Its radar is capable of detecting targets at ranges of up to 160 kilometers, but is believed to have only limited ability to track aircraft flying at low altitudes.

Iraq relies mainly on French air-to-air missiles. It has the infra-red guided R.550 Magic dog-fighting missile, which is capable of attacking aircraft only from the rear (where it can track the hot engine exhaust). It is inferior to the AIM-9L missile, and its replacements, which are all-aspect missiles that can engage a target from virtually any angle. Iraq also has the Super

530F, a radar-guided missile with a range of about 30 kilometers. It is a good quality system, but inferior to the U.S. AIM-7F Sparrow and AIM-54 Phoenix missiles or the British Sky Flash available to Iraq's opponents. Iraq also has a variety of Soviet air-to-air missiles, but they are substantially inferior to the French weapons.

In addition to inferior equipment, Iraqi pilots are not up to the standards of the opposing air forces. Except for a small group of French-trained pilots who fly the Mirage F-1 fighter-bombers, Iraqi pilots displayed mediocre skills when fighting Iranian aircraft. They will be at a decided disadvantage when facing aircraft flown by highly skilled British and American pilots. Even the largely unproven Saudi pilots are probably better skilled at air-to-air combat than the Iraqis.

To add to the Iraqi problems, they will not be able to rely on the type of sophisticated command and control systems available to the opposing forces. Iraq developed an integrated air defense command and control system, including the Baghdad-1 and Adnan-1 indigenously-developed airborne early warning aircraft. These systems will probably cease to operate relatively quickly, as radars and command posts are destroyed. Communications links will be subjected to intensive jamming, forcing pilots to operate without the cues provided by the air defense system. In contrast, the allied forces will operate with the support of the world's best command and control systems, including E-3 AWACS airborne early warning aircraft. These systems will be able to alert pilots to the location of Iraqi aircraft. As a result, Iraqi pilots will find themselves under attack with little or no warning, but will not be able to do the same to hostile aircraft.

In the final analysis, it is inevitable that Iraq will lose control of the air. It is less clear, however, that the Iraqis will necessarily lose all their aircraft in the process. Given the disparity in the air, it is more than possible that Iraq will chose to limit its activity, saving its aircraft in the process. Following this course of action would make it possible to mount hit-and-run raids against hostile aircraft operating deep in Iraqi territory without losing large numbers of their own fighters in the process. This may not prevent strikes on Iraq, but it will reduce the potential effectiveness of enemy air operations by forcing allied aircraft to take into account the possibility of opposition in the air.

Anti-aircraft defenses

Iraq's medium-range surface-to-air missile units are equipped with relatively dated Soviet systems, including an estimated 70 to 100 SA-2, SA-3, and SA-6 batteries equipped with about 325 to 400 launchers. (Iraq also may be able to use the Improved Hawk missiles captured from Kuwait.) The number of missiles for these launchers is not known. It is likely, however, that Iraq has several reloads for every launcher, suggesting that it has a minimum of 1,000 SAMs available to be fired at hostile aircraft.

The medium-range SAMs can engage targets at ranges of 25 to 43 kilometers. The SA-2 and SA-3 missiles operate from static positions, making them relatively easy to locate and attack. Iraq is reported to have upgraded some of these missiles, including fitting some with terminal infrared guidance. The SA-6 system is mobile, mounted on a tracked launcher, but it requires considerable time to move a complete battery from one location to another.

Experience from recent wars provides reason to doubt the potential effectiveness of these missiles. It is likely that Iraq will be able to shoot down no more than one aircraft for every 50 missiles fired. Hence, even if used with great effectiveness, the medium-range SAMs should be able to shoot down no more than 20 allied aircraft, assuming effective countermeasures are employed by the attacking aircraft.

Iraq's medium-range missiles are vulnerable

to hostile attack in one important respect. All employ a single-fire control radar to direct missiles against aircraft. If that radar is destroyed, the battery ceases to function. Countries with sophisticated SAM attack capabilities, like the United States, should have little difficulty locating those radars and destroying them.

Iraq also has 80 to 100 short-range SAM firing units, equipped with an estimated 325 to 400 launchers. The short-range SAM systems are of relatively good quality, including Franco-German Roland IIs and Soviet SA-8, SA-9, and SA-13 missiles. Most of these systems are mounted on wheeled or tracked launchers, and can be moved easily from one location to another. The only exceptions are about 100 Roland II launchers that are mounted in containers and generally operate from fixed positions. However, even the Rolands can be relocated easier than most of the medium-range missile batteries.

The short-range SAMs are less vulnerable to SAM suppression than the larger systems. All operate from self-contained launchers. Hence, every single launcher has to be destroyed to completely incapacitate a short-range SAM firing unit. This will be a difficult task, given that the launchers are not sufficiently distinctive to make them obvious targets for attack aircraft.

Iraq also has hand-held SAMs, including the Soviet SA-7, SA-14 and possibly SA-16 systems, as well as the Chinese HN-5A versions of the SA-7. The older hand-held SAMs should be largely ineffective against aircraft fitted with effective countermeasures. The performance of the newer missiles, however, may be significantly superior.

There may be as many as 4,000 anti-aircraft guns, consisting exclusively of Soviet systems. In addition to some large radar-guided 85mm, 100mm, and 130mm cannon, Iraq has a substantial number of 23mm, 37mm, and 57mm automatic guns and 14.5mm anti-aircraft machine-guns.

Most of the anti-aircraft guns are towed weapons relying on visual fire control systems. Only a small number of ZSU-23-4 radar-guided quad 23mm guns and ZSU-57-2 twin 57mm guns are self-propelled. Only the ZSU-23-4 guns provide effective radar fire control. The effectiveness of Iraqi anti-aircraft guns derives from numbers, not from mass. For example, one estimate is that it takes an average of 8,500 rounds fired from an S-60 57mm anti-aircraft gun unit to shoot down a single fighter.[11]

It will not be possible to destroy all the anti-aircraft guns, so that helicopters and aircraft operating at low altitudes will remain vulnerable to anti-aircraft fire so long as Iraq has any remaining ammunition. The guns are effective only at low altitudes, however, and aircraft carrying guided weapons should be able to fly above the coverage of the anti-aircraft artillery.

The allied forces facing Iraq possess some of the most sophisticated air defense suppression capabilities in the world. The United States in particular has large numbers of aircraft optimized for attacks on air defenses, including F-4G Wild Weasel strike aircraft, EA-6B and EF-111 stand-off jammers, and F-117 stealth fighters. The F-117s can penetrate Iraqi air defenses with little difficulty to attack radars, SAM sites, or command-control-communications nodes. In addition, other aircraft will be able to attack air defense sites with conventional ordnance, guided by near real-time intelligence gathering systems. Many of these aircraft will be armed with sophisticated anti-radiation missiles designed for attacks on radars.

Supporting strike aircraft will be a formidable array of electronic intelligence systems. The United States has RC-135 electronic intelligence aircraft in Saudi Arabia, supported by satellites and ground-based systems. They will be supplemented by more conventional intelligence gathering systems as well. These systems will provide target planners with complete coverage of the Iraqi electronic order of battle, and should

be able to identify the location of every Iraqi radar.

In addition, every aircraft that engages the Iraqis will be equipped with self-protection systems, including radar warning receivers to alert a pilot that he is being monitored by a radar, jamming pods to disrupt air defense radars, and chaff and infrared decoys to confuse radars and missiles.

Iraq lacks the experience to cope with sophisticated, massive attacks on its air defense system. Although it is unlikely that the Iraqi air defenses will be destroyed within a few hours, as suggested by some over-optimistic U.S. Air Force officers, the destruction of Iraqi air defenses is inevitable. Thus, within a relatively short period of time, Iraq will not be able to protect strategic targets from bombing attacks. And its ground forces will be open to massive bombing attacks of a scale never before witnessed in the Middle East.

Iraq probably does not have sufficiently large stocks of SAMs to make effective use of its existing launchers in the event of a protracted air war against the allied air forces. SAM units expend enormous numbers of missiles. According to one estimate, North Vietnam fired 4,244 SAMs in 1972 alone, managing to shoot down only 49 aircraft.[12] The Vietnamese were able to fire off such large numbers of missiles because they could rely on Soviet resupply. Similarly, when Egypt and Syria went to war with Israel in 1973, they depended on massive infusions of SAMs from the Soviet Union to replace those used in combat. Without the prospect of resupply from the Soviet Union, Iraq is likely to run out of missiles within a week.

Iraqi Ground Attack

Although Iraq has developed some sophisticated ground attack capabilities, it rarely made effective use of those assets during the course of the war with Iran. It has about 35 bombers, almost all of Soviet origin, primarily special-purpose systems suited best for ship attack missions. These are supplemented by about 280 additional aircraft assigned to ground attack squadrons. Many of the aircraft are obsolete and are not capable of surviving missions against an enemy with modern air defenses. Most lack an integrated radar attack-navigation system and, as a result, are unable to mount precision bombing attacks.

Nevertheless, Iraq can mount deep-strike missions. Many of its aircraft are designed for aerial refueling. The French-made Mirage F-1EQ fighter-bombers have a sophisticated weapons delivery system that permits high-accuracy attack, even at long ranges. Iraq also has a large inventory of sophisticated weapons, including French AS.30L laser-guided missiles and Armat anti-radiation missiles, Soviet AS-14 "Kedge" laser-guided missiles and AS-9 "Kyle" radar-attack missiles, and cluster munitions from Chile. Iraq has developed its own laser and television-guided munitions as well.

It is unlikely that Iraq will be able to take full advantage of the air-to-ground ordnance available to its air force. Although Iraq has some of the equipment needed to suppress hostile air defenses, it has never had to face the type of sophisticated, integrated air defense system that now exists in Saudi Arabia. Patriot and Improved Hawk medium-range SAMs are supplemented by Shahine and Chaparral short-range SAMs and radar-guided anti-aircraft guns. The ground-based air defenses, however, are merely a last ditch backup for the F-15 and Tornado ADV fighters now in Saudi Arabia. So long as allied air defense forces operate well, it is unlikely that many Iraqi aircraft will be able to penetrate these defenses and survive.

The Ground Theater

Iraq has a large army of about one million men organized into an estimated 60 combat

divisions. First-line combat units are limited to about 13 divisions and more than 20 special forces brigades. This includes the Republican Guard, an elite and politically reliable group of at least 6 divisions, along with approximately 7 mechanized and armored divisions of the regular army. Including units assigned to divisions, the Iraqi army has an estimated 30 armored, 18 mechanized and 150 infantry brigades.

Iraq never demonstrated a sophisticated ability to coordinate the capabilities of its combat arms. Greater cooperation appears to have been evident during the final battles fought in 1988, but that experience may be misleading. The Iranian forces were not capable by then of offering effective resistance, so that the coordination of units was never seriously tested.

Logistics may prove to be a critical problem for Iraq. Despite considerable improvement during the Gulf War, Iraq's logistics system appears to have been overly centralized and relatively inflexible. It is unclear that it could support units stationed in Kuwait in the face of hostile air attacks. Nor is it evident that it can adapt to the requirements of mobile warfare.

Armor

Iraq has a large armored force consisting of nearly 15,000 armored vehicles of all types, including at least 5,500 tanks, 8,000 armored personnel carriers, and hundreds of reconnaissance vehicles. Much of this equipment is relatively dated and qualitatively inferior to the weapons available to opposing military forces.

It is estimated that Iraq has only about 2,500 good quality tanks, including 500 to 1,000 Soviet T-72s, 1,200 T-62s, and an unknown number of improved T-55 tanks. Iraq initiated production of a license-built version of the T-72, known as the Assad Babyle, incorporating an Iraqi-built version of the standard 125mm gun and Iraqi electronics. The chassis and turret of the original versions were acquired from the Soviet Union. It is not known how many of these tanks have been built. The improved T-55 tanks have been fitted with the same 125mm gun used on the T-72, along with applique armor to improve survivability. Many Iraqi tanks have been provided with improved electronics, including modernized fire control systems, in place of the original Soviet systems.

Iraq has an estimated 1,000 Soviet BMP infantry fighting vehicles, along with an estimated 7,000 armored personnel carriers obtained from Brazil, France and the Soviet Union. These are supplemented by large numbers of Brazilian, French, Hungarian and Soviet light reconnaissance vehicles.

Although armored and mechanized units are among the best in the Iraqi military, there is no evidence to suggest that they are capable of fighting mobile battles against a high quality adversary. During the Gulf War, Iraqi forces were never tested in armored battles against well-trained and well-equipped adversaries. Nevertheless, during the final months of the war, these units demonstrated operational capabilities not evident earlier in the war. This included an ability to mount offensive operations that penetrated relatively deep into Iranian-held territory. This suggests that the units may be capable of greater operational flexibility than earlier experience demonstrated.

Iraq possesses an estimated 3,900 tank transporters, not including 900 civilian transporters that could be mobilized for military purposes. These vehicles gave Iraq a significant strategic advantage during the war with Iran, making possible rapid transfers of divisions from one part of the front to another. The strength of allied air power, however, suggests that the value of the transporters will be of less significance in a war over Kuwait. Efforts to move large formations will inevitably attract the attention of hostile air forces, and result in the massive destruction of equipment.

Infantry

The bulk of the Iraqi army consists of second-line infantry formations. While there are some good quality infantry formations, including the special forces brigades and the mountain divisions, most are capable only of holding static defensive positions.

Although unable to mount offensive operations, even at a tactical level, the second-line infantry divisions have a vital role in Iraqi military doctrine. The infantry divisions are generally deployed inside massive fortification systems, where their tactical limitations are of less significance.

Iraq built some formidable fortification systems during the Gulf War, especially in the southern part of the country to protect the city of Basra. The Iraqi fortification systems incorporated large minefields, concrete tank obstacles, antitank ditches and earth barriers, and large numbers of bunkers. It is likely that Iraq would employ millions of mines to strengthen these defensive positions, placing a high premium on mine-clearing equipment and tactics.

The effectiveness of Iraqi infantry will be enhanced by the large numbers of anti-tank weapons available to them. Iraq is estimated to have at least 1,500 anti-tank missile launchers, including some mounted on light armored vehicles and helicopters. There is no reason to believe, however, that any Iraqi anti-tank missiles can penetrate the frontal armor of an M-1 battle tank, which relies on sophisticated Chobham armor to defeat anti-tank missile warheads.

Most of the armored vehicles operated by forces in Saudi Arabia, however, will be vulnerable to Iraqi anti-tank weapons. The Saudi and U.S. Marine Corps M-60 tanks and the light armored vehicles of all the armies, including the all-important infantry fighting vehicles, can be penetrated by a host of Iraqi anti-tank weapons.

Artillery

Iraq has a formidable artillery force, equipped with at least 4,000 artillery pieces, including 500 self-propelled weapons and several hundred rocket artillery launchers. Qualitatively, Iraq has some of the best artillery weapons in the world.

Iraq is estimated to operate 500 self-propelled artillery pieces, including French, Soviet and even U.S. systems. It is possible that two new weapons are now in service: the 155mm Majnoon and the 210mm Al Fao. Both are mounted on wheeled chassis and were designed specifically for Iraq by Dr. Gerald Bull, the famed artillery designer assassinated in Belgium earlier this year. The Al Fao has a range of 57 kilometers and the Majnoon can fire 38 kilometers.

Iraq also has upgraded its older towed guns. It possesses at least 300 guns originally designed by Dr. Bull, including South African G-5 and Austrian GHN-45 155mm guns. These weapons have a range of up to 38 kilometers. Soviet M-46 130mm guns are being armed with new 155mm barrels, and an improved version of the standard Soviet D-30 122mm howitzer is now being manufactured in Iraq.

Iraq has one of the world's most formidable inventories of artillery rockets. Supplementing the well-known Soviet 122mm BM-21 and Brazilian ASTROS II launchers are a number of Iraqi-produced systems. Rockets for both systems are manufactured in Iraq. With the assistance of Yugoslavia, Iraq produces the Ababil in versions with ranges of 50 and 100 kilometers. In addition, Iraq has a 90 kilometer range version of the Soviet FROG-7.

Iraq possesses modern ammunition for at least some of its artillery systems. According to one report, cluster bomblet ammunition is produced in Iraq for 122mm artillery. Most of the long-range rocket artillery systems can be fitted with cluster munition or minelet warheads.

Iraqi officials claim that during the last two years of the war they were largely independent of external sources of ammunition. They appear to have acquired small steel mills, casting equipment to manufacture projectile casings, and plants to make both explosives and propellants. In addition, they are known to be able to manufacture cluster bomblets and may be able to manufacture minelets as well.

Iraq relied heavily on its artillery, and used it in enormous quantities. According to one study,

> Iraq routinely seems to expend about one U.S. Army "week" of munitions per weapon per day when it is in intense combat. Put differently, Iraq expended about as much ammunition per gun per week in early 1986 and 1987 as NATO countries have per gun in their entire inventory.[15]

In addition, the Iraqis appear to have made efforts to improve their artillery fire control and, as a result, some of their field artillery units may be able to deliver munitions in a timely, accurate fashion.

It was possible for Iraq to use ammunition in this fashion because battles during the war with Iran rarely lasted for more than a few days. As a result, the Iraqi army had no reason to conserve ammunition supplies. Under current circumstances, given that resupply would be difficult or even impossible, it is likely that Iraqi forces would take greater efforts to conserve supplies. This could cripple one potential source of Iraqi strength.

Overall Assessment

It will be difficult for allied forces to defeat Iraqi ground forces. Iraq's army is likely to fight from heavily fortified positions and will not engage in maneuver warfare except as a last resort. So long as the units remain stationed in fortifications, their vulnerability to air attack will be limited. In addition, this will make it difficult for their opponents to take advantage of the superior quality of their mechanized forces and at the same time maximize the value of Iraq's artillery.

If Iraq does not collapse under the pressure of intensive air bombardment, it will be necessary to launch offensive ground attacks on Iraqi units. Given the capabilities of Iraqi formations, such an offensive could be extremely expensive, unless the morale of Iraqi troops had been totally shattered.

Naval Theater of Combat

Iraq cannot win or lose a war in the naval arena. It is a land power and any decisive military encounters will take place on the ground or in the air. Nevertheless, the naval theater has considerable strategic importance, both for Iraq and for its adversaries.

Iraq is potentially vulnerable to amphibious attacks along its coastline, especially in Kuwait. The United States has deployed a substantial U.S. Marine Corps force on ships near the Persian Gulf. If landed behind Iraqi lines, these units could endanger Iraqi formations stationed at the front.

This potential vulnerability to amphibious attacks makes Iraqi coastal defenses an important component of any effort to defend Kuwait. Dedicated coastal defense forces will be supplemented by infantry and mechanized forces deployed near critical targets on the coast.

Coastal defense forces will rely primarily on anti-ship missiles and naval mines. Iraq possesses anti-ship missiles acquired from China, France and the Soviet Union. In addition, Iraq's defense industries has designed and manufactured the Fao family of anti-ship missiles, adapted from Soviet designs. Iraq is known to have anti-ship missiles with ranges of up to 200 kilometers

and may possess systems with even longer ranges. Iraqi forces have more experience in the use of anti-ship missiles than any other country, firing hundreds of them during the Gulf War at Iranian and neutral shipping in the Persian Gulf.[14]

The anti-ship missiles can be launched from ground-based batteries, ships, helicopters and aircraft. Although all of these forces will be subjected to concentrated attacks by allied forces, the number and variety of systems available ensures that at least some will remain operational. Land-based anti-ship launchers pose special problems, given the multiplicity of locations in which they can be hidden prior to actual use.

Iraq has Soviet, Italian and Iraqi naval mines, possibly several thousand in all. This includes old moored mines, as well as sophisticated influence bottom mines that can be laid by aircraft or surface ships.[15] Significantly, Iraq has developed its own family of influence mines, the Sumer series. The mines can be delivered by aircraft, ships, or submarines (although Iraq has no submarines), and they rely on computer-controlled firing devices. In addition, Iraq developed two anti-invasion mines, the Sigeel and the Al-Muthena.[16]

Iraq should have little difficulty laying mines in areas potentially vulnerable to amphibious assaults. The U.S. Navy is unlikely to operate ships in mine-infested waters. It is extremely difficult to conduct mine-clearing operations against sophisticated bottom mines of the type in Iraq's arsenal. Unlike the moored mines used by Iran, it is virtually impossible to sweep an influence-type bottom mine. They must be located one-by-one and destroyed individually. This is a painstaking process that could take days or weeks.

Iraq can pose serious problems for an amphibious assault force, if it takes advantage of its capabilities. Neutralization of anti-ship missiles and naval mines will require a substantial effort on the part of the U.S. Navy and supporting forces if a successful amphibious attack is to be launched.

The naval theater of combat also presents some interesting offensive options to Iraq. Oil exports through the Persian Gulf are of vital importance to the world. Although Saudi Arabia can export a significant amount of oil through its pipeline to Yanbu on the Red Sea, about 60 percent of its oil is shipped by tanker from facilities in the Persian Gulf. Other countries in the area are even more reliant on tanker shipment of oil. About 9 million barrels a day in oil is shipped by tanker from the Persian Gulf every day, equal to about 15 percent of world oil production. The world economy depends on the continued flow of that oil. There are no long-term alternatives available and without it massive economic dislocations will inevitably take place.

The dependence of its adversaries on oil shipments offers Iraq a strategically important military option. If Iraq can disrupt the movement of oil tankers through the Persian Gulf, it can inflict a punishing blow on its adversaries. Even marginal success in a campaign against oil shipments, if sustained for a period of weeks or months, could be a major victory for Iraq. Thus, the ability of Iraq to attack tankers is of great concern.

Least important are the naval combatants. The Iraqi Navy operates only a small number of fighting ships of limited capability, including 10 Soviet-supplied Osa-I and Osa-II missile boats. These are supplemented by a Yugoslav-built training frigate, 10 patrol craft, 9 minesweepers, and 6 amphibious warfare ships. More significant are the aircraft operated by the Iraqi Air Force, many of them intended for naval operations.

The most important are Mirage F-1EQ5 fighter-bombers armed with AM.39 Exocet anti-ship missiles. Relying in part on aerial refueling,

Iraq was able to mount Mirage F-1 attacks on targets at a considerable distance from Iraq. The USS Stark was northeast of Bahrain in the center of the Persian Gulf, about 400 kilometers from Iraqi territory, when it was attacked by an Exocet-armed Mirage F-1. Iraqi Mirage F-1s were employed to hit tankers operating near Sirri and Larak islands in the eastern Persian Gulf. Sirri was 640 kilometers from Iraq. The attack on Larak required a round trip of 1,560 kilometers. Iraq also has Chinese H-6 and Soviet Tu-16 and Tu-22 bombers that could be used in ship attack missions, but only if they are able to launch anti-ship missiles from areas not protected by hostile air defenses.

Allied air and naval forces should be able to minimize or even eliminate the threat posed by Iraqi naval attack aircraft. Unless Iran is willing to allow Iraq to violate its air space, all Iraqi aircraft will have to operate through a narrow corridor bounded by the borders of Iran and Saudi Arabia. This area is certain to be subjected to intensive coverage by allied air assets, including monitoring by AWACS early-warning aircraft and land-based radars. Accordingly, only a few Iraqi aircraft are likely to penetrate into the Gulf without being detected and intercepted by allied air defense fighters. Once in the Persian Gulf, the aircraft also will be vulnerable to allied naval forces armed with anti-aircraft missiles. As a result, it is unlikely the air attacks will become more than a serious nuisance, capable of only minor disruptions in the flow of oil.

Of more concern is the possibility that Iraq may use its naval mines to interdict tanker movements. The size of supertankers restricts their movement to only a limited area in the Persian Gulf, making it necessary for them to follow well-known routes. Unless we were willing to accept the risks of high ship losses, laying even a handful of mines along these channels could completely stop the movement of tankers. As noted earlier, bottom mines are difficult to detect and must be cleared individually.

The mines can be laid from aircraft or ships. In contrast to anti-ship missile operations, which have to take place at a time and place when ships are present, minelaying can take place in areas where there are no ships. Thus, the potential risks are lower. Even more seriously, mines can be laid covertly from seemingly innocent merchant ships. Moreover, it might even be possible to lay them in the Red Sea, if Iraq can get cooperation from a third country (such as Libya, Sudan or Yemen). Preventing such operations will not be an easy task, but it can be done. It will require intensive monitoring of shipping activity, especially by small ships.

Overall Assessment

Should a war erupt, Iraq will try to ensure that it survives the opening blows. Although Saddam Hussein will seek to persuade his opponents of the need to abandon hostilities as quickly as possible on terms favorable to Iraq, he will strive to convince his adversaries that a war might last months and involve more casualties than the United Nations forces are prepared to accept. In addition, he will seek to inflict severe punishment on his enemies, to convince them that the costs of a war are not worth any potential gains. This means preserving strategically important military assets, such as aircraft and high-quality combat units.

Militarily, Iraq has some critical vulnerabilities, as well as some very real strengths. A successful campaign against Iraq would require exploiting its vulnerabilities and at the same time not allowing it to take advantage of its strengths.

Iraq has two main advantages. First, it has a large, well-equipped army capable of fighting a defensive war. Although many of the troops available to Iraq are second-rate, there are also high-quality units. Attacking Iraqi ground forces, even with complete air superiority, will not be an easy task. The enormous numbers of units and the substantial size of the equipment invento-

ries make it unlikely that an offensive would succeed without taking heavy casualties.

Second, Iraq also has some impressive offensive capabilities, if it gets a chance to make use of them. Experience from the Gulf War suggests that Iraq is capable of launching anti-ship missiles at targets located long distances from its territory. Similarly, Iraq has some impressive naval mine capabilities, which could pose major problems for the allies if effectively employed.

Iraq has several critical weaknesses. It is extremely vulnerable to air power. It cannot protect rear areas from strategic bombing attacks. Beyond the destruction caused by the strikes, the ability of hostile forces to operate at will over Iraqi territory could be a severe blow to morale. Moreover, strikes against ground forces will severely hamper the fighting effectiveness of the Iraqi ground forces. It will be difficult for Iraq to redeploy units without suffering heavily from air attack.

It must be stressed, however, that it is highly unlikely that Iraq can be defeated solely through air attacks. Historical experience indicates that strategic bombing campaigns cannot win wars unless accompanied by successful ground operations. Similarly, armies cannot be defeated solely by the application of air power. Even in the 1967 Arab-Israeli war, when Israel made extraordinarily effective use of air power, it had to rely on a large ground offensive to defeat the opposing armies. Air power enhances the effectiveness of ground troops, but cannot replace them.

Thus, the outcome of a war is likely to depend on ground operations. Although the effectiveness of the allied armies will be significantly enhanced by the activity of friendly air forces, Iraq will still be able to exploit its large ground forces and its ability to operate from fortified positions.

However, Iraq has never had to face large, well-trained and equipped military forces. The Iranian military lacked command, communications, logistics, and tactical capabilities that most armies take for granted. As a result, the Iraqi military has never been tested against a modern military force of any description.

Iraq also will suffer from the effects of the embargo, especially if the fighting lasts more than a short period of time. Iraq has a large defense industry, but bombing operations are likely to curtail severely manufacturing activity. Hence, Iraq will be unable to obtain critical supplies, reducing the effectiveness of its military forces. In some cases, the reduction in capabilities will be gradual. In other areas, however, it is possible that drastic reductions in capability will be evident after only a few days of fighting.

Ultimately, much will depend on the will of Iraq's leadership and on the stamina of Iraqi troops. If Iraq's top political and military leaders have the fortitude to withstand intensive air attacks, the war will be decided on the ground. It is possible that efforts could be made to remove Saddam Hussein, but it would be dangerous to base a strategy on such a remote possibility.

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NOTES

1. A number of sources were used extensively while writing this account. Although mentioned only a few times in the following notes, they were essential. Anthony Cordesman and Abraham R. Boulder, *Lessons of Modern War–The Iran-Iraq War* (Boulder, Colorado: Westview Press, 1990), provides the best compilation now available on the military aspects of the Gulf war. Information on Iraqi inventories was provided by four often contradictory sources: International Institute for Strategic Studies, *The Military Balance 1989-90* (London, Brassey's for the International Institute of Strategic Studies, 1989), pp. 101-102; The Jaffee Center for Strategic Studies, *Middle East Military Balance 1988-89* (Boulder, Colorado: Westview Press, 1989), pp. 174-184; the October 1990 issue of *Jane's Soviet Intelligence Review;* and the *Military Powers Encyclopedia: Volume 4: The League of Arab States* (Paris: Societe I^{5}C, May 1989), pp. 59-118.

2. The biological warfare program is discussed in W. Seth Carus, *The Genie Unleashed: Iraq's Chemical and Biological Weapons Program,* Policy Paper Number 14, The Washington Institute for Near East Policy, 1989, pp. 29-35, and Michael Eisenstadt, *"The Sword of the Arabs:" Iraq's Strategic Weapons Program,* Policy Paper Number 21, The Washington Institute for Near East Policy, 1990, pp. 5-9.

3. From Proposed Remarks by William H. Webster, Director of Central Intelligence, at the Foreign Policy Association, New York City, September 18, 1990, p. 5.

4. Molly Moore, "Iraq Said to Have Supply of Biological Weapons," *The Washington Post,*. September 29, 1990, p. A1.

5. Statement of William H. Webster, director of the Central Intelligence Agency, before the Senate Committee on Governmental Affairs, Hearings on the Global Spread of Chemical and Biological Weapons: Assessing Challenges and Responses, February 9, 1989.

6. Iraq is reported to have cannibalized its inventory of Soviet-supplied Scud-B missiles to manufacture its initial batches of Al-Husayn missiles. Hence, it is unlikely that any remain in active service. Nor is there any firm evidence that the Al-Abbas was ever deployed operationally. Iraq announced a successful test of the missile in April 1989, and subsequently showed it at several arms exhibitions in Baghdad. The Al-Abbas is an 800-kilometer range version of the 600-kilometer range Al-Hussein. The Al-Hussein was derived from the Soviet 300-kilometer range Scud-B. To create the Al-Hussein, Iraq had to increase the amount of fuel carried by 50 percent, and reduce the weight of explosives from 800 kg to only 160 kg. It is difficult to see how Iraq could have created the Al-Abbas without further reducing the payload. Hence, it is possible that the Al-Abbas has no explosive charge at all. It should be noted, however, that the main destructive effects of the Al-Hussein may have come from the impact of the missile and not its explosive charge, so that eliminating the high explosive altogether may not significantly reduce the effect of the missile.

7. One report mentions a sighting of a missile called the As-Saddam in Kuwait. This designation is new, and could refer to a follow-on to the Al-Hussein.

8. BBC Panorama, "Saddam's Secret Arms Ring," **BBC Panorama,** September 3, 1990.

9. Cordesman and Wagner, *Lessons of Modern War— Volume II: The Iran-Iraq War,* p. 449.

10. Most sources place the inventory of MiG-29s at 18 to 25, but those figures may reflect dated information.

11. David Isby, *Weapons and Tactics of the Soviet Army,* second edition (New York: Jane's Publishing, 1988), p. 321.

12. Isby, *Weapons Tactics of the Soviet Army,* p. 336.

13. Cordesman and Wagner, *Lessons of Modern War— Volume II: The Iran-Iraq War,* p. 452.

14. Through the first seven years of the war, Iraq is reported to have hit 177 merchant ships using antiship missiles fired from aircraft and helicopters. See Cordesman and Wagner, *Lessons of Modern War,* p. 545.

15. John Boatman, "Threat From Below the Waterline," *Jane's Defense Review,* September 22, 1990, p. 502. Iraq has the Soviet and Italian Misar. Norman Friedman, *World Naval Weapons Systems* (Annapolis, Maryland: Naval Institute Press, 1989), p. 448, notes that the MR-80 was exported to several countries in the Middle East. There is a more advanced export version, the MRP, which uses microprocessors to activate the firing mechanism, but it is not known if Iraq has received it.

16. Friedman, *World Naval Weapons Systems,* p. 501. John Boatman, "Threat From Below the Waterline," *Jane's Defense Review,* September 22, 1990, p. 502, claims that there are two versions of the Muthena, one with a 35 kg explosive charge and a second with a 45 kg charge. The Sigeel has a 400 kg charge. Note that Iraq might be able to lay the mines at distant locations— in the Red Sea or the Mediterranean— laying them from foreign-flag ships operating from countries friendly to Iraq.