

# IRAQ'S SECRET NUCLEAR WEAPONS PROGRAM

UN inspectors discovered an electromagnetic isotope separation factory that put Iraq just 18–30 months away from having enough material for a bomb. They also found European centrifuge technology and plans for an implosion device.

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The inspections of Iraq mandated by the United Nations as a cease-fire condition at the end of the Gulf War in February 1991 have revealed a clandestine nuclear materials production and weapons design program of unexpected size and sophistication. The total value of that program, in terms of equipment and personnel deployed between 1981 and 1991, may be on the order of \$5–10 billion. The program employed an estimated 7000 scientists and 20 000 workers.<sup>1</sup>

The UN inspections, which originally were expected to be completed in a relatively short period, have now been in progress for a year and appear likely to continue for the indefinite future. This article describes the inspection process and the discoveries made to date.

Authority for inspections in Iraq is provided by UN Security Council resolution 687. This resolution, to which the government of Iraq agreed—albeit under extreme duress—requires the declaration of all Iraqi weapons of mass destruction and capabilities to produce such weapons. The weapons and associated production capabilities are to be “destroyed, removed or rendered harmless.” For the purposes of the resolution, weapons of mass destruction are defined as chemical, biological or nuclear and as ballistic missiles with ranges in excess of 150 km. To accomplish the mandate of resolution 687, the Security Council established an *ad hoc* body, the UN Special Commission, headed by Rolf Ekeus of Sweden. By mid-1992, 39 UNSCOM inspections had been carried out, 12 of them of nuclear facilities.

Chemical, biological and ballistic missile inspections are carried out by Special Commission teams composed primarily of active-duty military personnel who have the requisite technical skills for identification, safe handling,

and dispersal or destruction of seized items. The nuclear inspections are carried out by the International Atomic Energy Agency with the assistance and cooperation of the UN Special Commission.

The IAEA is the UN body charged with the management of nuclear safeguards, including those required under the Non-Proliferation Treaty, which Iraq had joined. In addition to IAEA safeguards experts, who are knowledgeable primarily about the nuclear energy fuel cycle, the UNSCOM teams have included specialists in nuclear weapons design and fabrication, enrichment technologies, and manufacturing and industrial technologies. At the request of the IAEA or UNSCOM, these experts were nominated by the five nuclear weapons states, which also are the five permanent members of the UN Security Council.

## Role of national intelligence

In contrast to traditional IAEA inspections, the UNSCOM teams had action plans formulated partially from intelligence information provided by member states of the UN. In the past intelligence information would not have been offered to the IAEA and would likely have been rejected if it had been. It was the policy of the IAEA's directors not to work with intelligence agencies.

A mixture of intelligence from agents on the ground and from overhead imaging has been used to produce a list of targets and the rationales for inspecting them. If the leadership of the Special Commission and the IAEA determine that a mission is advisable, a team with the requisite skills is formed to carry out the inspection. The process is iterative in the sense that as intelligence leads are checked and inspectors gain a more refined sense of what evidence would be most telling, facilities, equipment and documents are revisited and reanalyzed, leading to further refinements.

About half the members of the initial teams were technical personnel and about half support staff to provide medical care, language interpretation, communications and explosive ordnance services (that is, supervision of the destruction of sensitive equipment and facilities). The proportion of support staff has decreased in recent missions, which have performed less fieldwork. Team sizes have ranged between 25 and 45, and individu-

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als from as many as 17 nations have served on one team.

Effective working time in the country has been limited to two weeks because of physical fatigue resulting from long working days and psychological fatigue resulting from Iraqi attempts to frustrate access and deny the rights of the inspectors.

In theory, inspection teams have unlimited rights of access to and embargo of any facility in Iraq. By "embargo rights" we mean the right to stop all movement into or out of a facility during an inspection. In practice, because the teams operate without armed UN escort and are under the effective control of Iraqi security forces, access and success in the field have depended on constant negotiation (with excellent long-range support from the Security Council) and carefully considered risk-taking at crucial moments. (The period in which we ourselves were in Iraq was the time of maximum confrontation with the Iraqis and of the greatest revelations about their nuclear program.)

Despite their *ad hoc* nature, limited field resources and unprecedented multinational character (which entailed potential political as well as operational difficulties), the inspections have been very successful. They exposed an Iraqi program that soon would have proceeded with the fabrication of nuclear weapons, and they identified its leadership, procurement practices and scientific elements. Facilities and capabilities that were unknown, or at least untargeted, during the Gulf War have been analyzed and, when appropriate, destroyed.

## Origins of the Iraqi program

The Iraqis attributed their decision to proceed with a secret enrichment program, and subsequently a weapons program, to the Israeli bombing of the Osirak reactor in 1981. (See *PHYSICS TODAY*, August 1981, page 53.) The Osirak reactor was located at Tuwaitha (see figure 1), which remained the principal locus of Iraq's nuclear program.

Jaffer Dhia Jaffar, vice chairman of the Iraqi Atomic Energy Commission, who was deputy minister of industry

and head of reactor physics at Tuwaitha at the time of the bombing, claimed repeatedly to the inspection teams that Iraq had followed all safeguard rules for the reactor. Jaffar, a physicist educated at the University of Manchester, England, and Imperial College, London, appears to have been the head of Iraq's nuclear program. He complained that the world community, particularly the US, did not punish the Israelis or compensate Iraq for its losses from the attack. To some extent, such conversations with leaders of Iraq's nuclear program had a "we hadn't cheated yet" flavor to them.

The real Iraqi intentions at Osirak remain unknown even to this day. But the subsequent evasions of safeguards by the Iraqis, for example at the smaller Soviet-built reactor at Tuwaitha beginning in 1988, show that they were both willing and able to cheat on treaty obligations.

The Osirak bombing cost the Iraqis \$750 million in hard currency. Jaffar said that the government elected to switch its nuclear program from reactor technology, which implies the ability to produce plutonium, to uranium enrichment, because investment in enrichment would produce a dual-use industrial infrastructure and trained personnel that would benefit the Iraqi nation in many ways.

In 1982 the Iraqis began to explore electromagnetic isotope separation at Tuwaitha, confident that they already had the skills and technology necessary to master it. Parallel efforts in centrifuge, gaseous diffusion, chemical enrichment and laser isotope separation were begun at the same time. Centrifuge technology was a major element in the Iraqi program and will be described in more detail below. The Iraqis evaluated gaseous diffusion technology a couple of times, as recently as 1987–88, but they decided not to pursue it—partly, they told inspectors, because they thought they would not be able to procure needed supplies without attracting unwanted international attention.

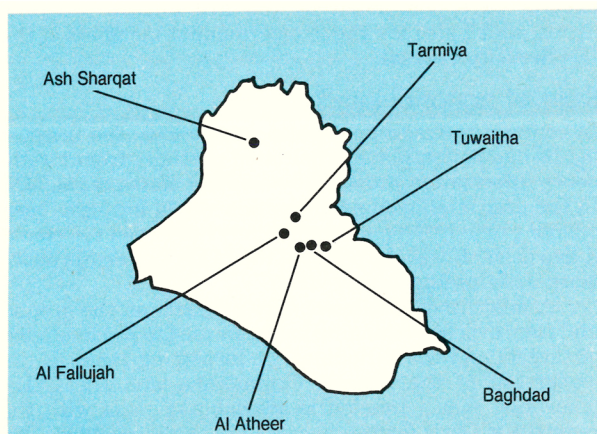
Iraq's work on chemical enrichment involved CHEMEX, a solvent extraction method developed by the French that supposedly is proliferation resistant. Although the Iraqis were evaluating isotope enrichment, inspectors were unable to determine just how much had been done because the Iraqis completely destroyed the pertinent laboratory building.

Electromagnetic isotope separation, in any event, turned out to be the linchpin of the Iraqi nuclear program. EMIS was uniquely well suited for Iraq because of the country's abundant and cheap electrical power, especially its very large hydroelectric capacity, which lies idle much of the time. Also, EMIS could be used as a "topping cycle" to do final enrichment of partially enriched feedstock from other enrichment methods—just as it was used in the US Manhattan Project.

Overlooking the possible use of EMIS by any nation seeking to build nuclear weapons stands out as a major prewar intelligence error—on the part not only of national intelligence agencies and the IAEA but also the independent expert community. Even after UNSCOM inspectors first began to fathom the role that EMIS played in the Iraqi program, some experts on nuclear technology and proliferation still found it hard to believe that the Iraqis had put so many eggs into what always had seemed an unpromising basket.

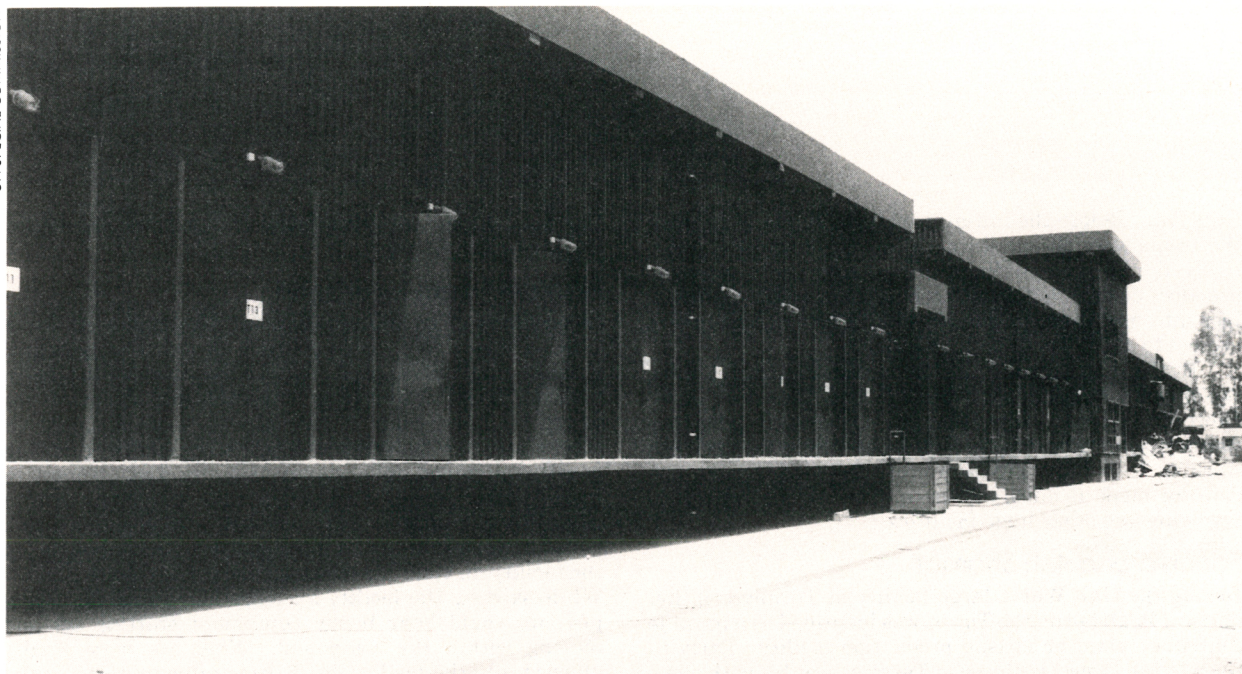
## Electromagnetic separation at Tuwaitha

During the early 1980s the Iraqis built several generations of EMIS hardware at their declared nuclear research site at Tuwaitha. The 800-kW French reactor and 5000-kW Soviet reactor at Tuwaitha continued to operate, and they



**Geography** of Iraq's nuclear weapons program: Tuwaitha site was dedicated to experimental work on electromagnetic isotope separation, centrifuge enrichment and plutonium production, among other things; Tarmiya complex and duplicate at Ash Sharqat were to support industrial-scale EMIS; atomic bomb design ("weaponization," in the UN inspectors' jargon) was centered at Al Atheer. Significant confrontations between UN inspectors and Iraqis took place in Baghdad and at Al Fallujah. **Figure 1**





**Transformer building**, one of two at Tarmiya, was to provide power for electromagnetic separation of uranium isotopes. Behind each of its 64 doors is a 1-MW power transformer. The Tarmiya complex was being built at an estimated cost of \$2–3 billion, and a duplicate complex was being built at Ash Sharqat. **Figure 2**

were inspected by the IAEA under the Non-Proliferation Treaty safeguards system.

The IAEA has been criticized for not detecting the various undeclared activities at Tuwaitha, but it is important to point out that only declared nuclear material, not facilities, is safeguarded. While the IAEA has the authority to call for special inspections, the agency never has done so, and there is no record of any NPT signatory's presenting either a request or data calling for such an inspection in Iraq.

The Iraqi EMIS program used unclassified data from the Manhattan Project as a starting point and progressed through several generations of prototype devices to optimize the design of production equipment. In the Manhattan Project it originally was anticipated that the calutrons invented at the Radiation Lab at the University of California, Berkeley, would be the main source of highly enriched uranium for the first atomic bombs, but serious problems arose when the devices were scaled up in a "racetrack" configuration at Oak Ridge.<sup>2</sup>

In a calutron a strong magnetic field is applied to an accelerated beam of uranium ions, causing them to separate into  $^{235}\text{U}$  and  $^{238}\text{U}$  components. The problem of scaling up the beam linearly with increased current and the tendency of the twin beams to spread place important limits on the efficiency of the devices.

The Iraqi ion sources began as 0.5-milliamp devices and were developed into a 150-mA production version while the Iraqis acquired experience running the sources singly and in multiple sets. The mean radii of the magnetic sectors started at 500 mm for the nominal 35-keV  $\text{U}^{+}$  ions and were enlarged to 1000 mm in several versions as operating experience was gained.

Of especially great importance—bearing in mind that EMIS is a batch system—was the fact that the Iraqis incorporated modern microprocessor, fiber optic and

computer-assisted manufacturing controls into the systems to achieve gains in reliability, precision and availability. Such innovations, combined with certain good engineering ideas, enabled them to reduce turnaround time and boost the utilization factor (the proportion of time the systems are in operation) to better than 50%.

Failure to take possible gains of this kind into account was an important element in the general misestimate, in intelligence and expert circles, of the potential of electromagnetic separation.

### Other deceptions at Tuwaitha

All of the materials, machine tools, vacuum components and electronics required for electromagnetic enrichment technology are uncontrolled items available to any research laboratory. An open question is whether the Iraqis' acquisition of those items in the numbers required to proceed to industrial-scale enrichment should have raised questions in the intelligence communities about Iraq's intentions.

In parallel with the design of the EMIS equipment, the Iraqis developed the chemical processes necessary for  $\text{UCl}_4$  feedstock production and recovery, and conversion of product to new feedstock for subsequent enrichment. Additional experiments at Tuwaitha supported centrifuge development and  $\text{UF}_6$  feedstock production, testing of chemical enrichment techniques at the milligram level, and some exploration of laser isotope separation physics.

Independently of the EMIS effort, the Iraqis, in a successful evasion of their safeguards obligations under the NPT, fueled the model fuel bundle from their Soviet reactor—a bundle intended for display purposes only—and covertly produced and separated some 3 grams of plutonium in addition to 3 g produced from fuel elements exempted, with IAEA approval, from safeguards.

The Tuwaitha site was heavily bombed during the

Gulf War. Before the initial inspection trip in May 1991, the Iraqis were observed removing equipment and selectively destroying buildings. They also used deceptive practices such as bulldozing rubble from adjoining buildings into several of the structures and moving equipment around to avoid detection by the team.

By the time a second UN team arrived in Iraq in June, the physics building at Tuwaitha had ceased to exist. However, during the first team's visit, a defector fled the country and claimed to have been an electrical engineer working in a huge EMIS project. Testimony from the defector made it much easier to piece together a puzzle involving two other huge facilities.

### Tarmiya and Ash Sharqat

During the Gulf War a large facility at Tarmiya, 45 km north of Baghdad on the Tigris, was identified as a possible centrifuge plant or missile production facility. Early in the war the largest building at Tarmiya was hit with a few rockets by a US plane diverted from another mission. Reconnaissance revealed a spectacular Iraqi response: hundreds of personnel removing equipment from the building. Its importance having been confirmed, that site and a site containing identical buildings at Ash Sharqat, 500 km away in northern Iraq, were subsequently destroyed in large air raids. According to Iraqi staff at Tarmiya, B-52s were employed in these raids.

Ground inspection of the Tarmiya site by the first UN team ruled it out as a centrifuge or missile production facility. While four of the five major buildings clearly had had no process equipment installed in them, the status of the fifth building was unclear. This large building (building 33 in UN notation) measured about 80 by 120 meters and was flanked by two satellite buildings containing 132 1-MW power transformers that fed power to switch gear in the central building (see figure 2). Power to these flanking buildings was distributed underground from a 175-MW substation on the site. The amount of power, the physical layout of building 33 and the supporting site utilities suggested that it had been designed as the primary process building for EMIS work. The site itself was fed by a 30-kV underground line from a major substation several kilometers away.

Military defense systems and multiple exterior fences were absent at Tarmiya, but it was later discovered that the entire surrounding area was a military exclusion zone.

A smaller building at Tarmiya, itself undamaged, had a similar layout of utilities and support equipment, suggesting that it was designed to support a secondary separation step (final-stage enrichment). Connected to this building was a smaller transformer building containing 25 transformers, varying in size between 1 MW and 2 MW, that had been heavily damaged. The other major buildings on the site all had been designed for process chemistry: They contained evaporators, mixer-settlers and so on, and they had massive air filtration systems of a design suitable for suppression of particulate emission.

The overall impression at the Tarmiya site was of integrated physics and chemistry facilities necessary for industrial-scale work (on electromagnetic separation). All buildings and the utility support infrastructure at Tarmiya were built by a Yugoslav firm to Iraqi design criteria.

The Iraqis then took the plans and duplicated the entire facility at Ash Sharqat.

### First-ever snap inspection

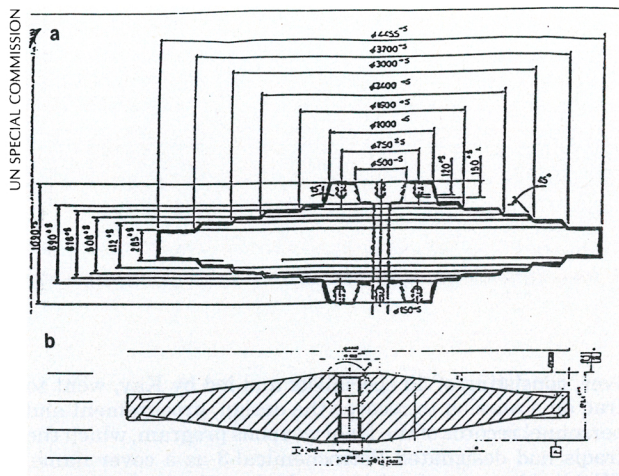
Observation of Iraqi actions during May and early June 1991 revealed that large circular pieces of equipment, possibly magnet pole pieces, were being repeatedly buried, uncovered and moved near Tuwaitha and Tarmiya (see figure 3). More than 20 such objects were observed on trucks, and another 50 to 80 trucks were spotted carrying boxed equipment under tarps. On the first attempt to inspect this material, at an Iraqi military facility at Abu Gharaib on 23 June 1991, we were able to photograph boxed material through a fence but were denied access to the facility, in violation of our rights under resolution 687. While skirting the facility for more long-range photography, we could hear heavy equipment starting up and moving within the compound. When we were finally allowed into the facility on 26 June after protests by the UN, we found it completely empty.

The previous inspection attempts had all been made with notice of at least six hours, and all had been frustrated by Iraqi deception or refusal to allow inspectors site access. On 28 June the first zero-notice inspection attempt under resolution 687—and as far as we know the first in the history of on-site inspection—was successfully carried out. Arriving at the gate of a military transport compound west of Baghdad called Al Fallujah, we were again denied access. Members of the team were allowed, however, to climb a water tower inside the facility fence. From that vantage point, they saw a convoy of approximately 100 trucks start up and move out of the rear of the compound through the desert (see figure 4). As the Iraqis continued to deny both access and embargo demands, team members made a 30-km end run around the facility and successfully caught and photographed the entire convoy. Team members who took photographs were fired upon, stopped and searched by Iraqi plainclothes security but were able to preserve the film. The photographs and the Iraqi behavior established both noncompliance with resolution 687 and the existence of a major undeclared program. When asked to produce the convoy for inspection, the Iraqis graciously assembled a synthetic convoy at Fallujah and allowed us to spend two days documenting that it did not contain the photographed items.

After the truck chase and shooting at Fallujah and the withdrawal of the inspection team from Iraq, the UN put great pressure on the Iraqis to comply fully with resolution 687. The Iraqis subsequently chose to declare their enrichment programs, providing drawings and seminars on the EMIS activity; they assisted the next few inspection teams in recovering material from the convoy that had been taken to the desert, as well as peripheral parts slated for centrifuges in development. Most of the material on the convoy was from Tarmiya, where 8 first-stage separators were in operation at the time of the bombing, and 17 in assembly.

The process bay in building 33 at Tarmiya was designed to hold 70 separators. Initial installation had begun in January 1990, at the rate of approximately one separator per month, and the 8 in operation when the war began were at various points of development. In one





and carbon-fiber rotors—all of which are controlled materials and technologies—were present in abundance and obviously had been acquired easily from a wide variety of Western suppliers, though *not* necessarily from the manufacturers.

A flow-forming machine the Iraqis had somehow obtained came with an application-specific mandrel, expanding mandrel and rollers; an electron-beam welder came with a special feature for holding rotor tubes during welding; three large numerically controlled machine-tooling machines had application-specific features; and a large oxidation furnace had special temperature control features. The Iraqis also had high-frequency converters capable of operating a large number of centrifuges; horizontal and vertical balancing machines for rotors; hand-operated, pneumatic and electrically controlled bellows valves; and quantities of a nuclear-grade fluorinated vacuum pump oil.<sup>3</sup>

In addition, the Iraqis obtained large quantities of stock materials, including 300 tons of aluminum alloy tube extrusions for vacuum housings (enough to make 2500), 84 tons of aluminum alloy tube extrusions for molecular pumps (enough for 6000), and 240 000 ferrite magnet spacers and 10 000 soft-iron ring band cores (enough for manufacture of 10 000 stators for centrifuge motors).<sup>4</sup>

Companies that built products used in the Iraqi nuclear program are located in Germany, Switzerland, the US and Japan, among other countries. But “identification of a manufacturer does not necessarily mean identification of the supplier,” the eighth UN inspection report<sup>3</sup> cautioned, and, it noted, “much of the equipment listed above is multipurpose.” Nonetheless, the report said, “the application-specific fixtures remove most doubt as to the intended uses. Some of the companies may not have been aware that Iraq was the final customer, but the intermediaries certainly were.”

The Iraqis claimed to have had little success with the centrifuge enrichment program, but a mismatch between the sophistication of the materials they admit having imported and the centrifuges they turned over to inspectors raises concern that a hidden centrifuge facility remains to be found.

### Parking lot confrontation

The balance of the inspections in summer 1991 were spent verifying Iraqi declarations of inventory and performance and visiting feedstock and fabrication sites, most of which had been successfully targeted during the war. The teams also visited an explosives and materials science facility at Al Atheer that appeared suitable for weapons component fabrication and assembly. During this time the Iraqis continued to deny that they had any intention of producing weapons or that they had engaged in design efforts.

In September the largest nuclear inspection team

ever, consisting of 45 specialists and led by Kay, went to Iraq on a mission to recover the design, procurement and personnel records of the Iraqi weapons program, which the Iraqis had designated Petrochemical-3 as a cover name. PC-3 had been moving its records since the start of the inspections to avoid their discovery. At all research and production facilities this technique had succeeded. All the facilities the UN inspected were free of paper, with only trivial exceptions.

In two dawn inspections in Baghdad itself on 23 and 24 September, the UN team managed to find the targeted records, and though it was detained in violation of inspection and diplomatic rights, it recovered conclusive proof of the existence of a serious weapon-building program. On 23 September, at a design center in Baghdad, the team found reports on design calculations for an implosion weapon and on supporting experiments on explosive lenses, neutron initiators and firing sets.

A more serious confrontation occurred the next day, when the team found procurement and personnel records for PC-3 in buildings adjacent to Iraqi internal security headquarters in downtown Baghdad. This target, which had been known for some time, was across the street from hotels that the inspection teams had used for months. After members left the building with documents and hard disks hidden in their clothing, the team was detained in the building parking lot for four days while drummed-up popular demonstrations were held nearby, until both sides agreed on a compromise allowing mutual copying of the documents. As the siege was going on, since the team lacked fax technology, members read some documents over the phone to headquarters and photographed others.

After the siege ended, some 70 000 pages of documents were brought to Vienna for translation and analysis so that the Iraqi procurement system could be pieced together and the degree of innocence or complicity on the part of suppliers could be determined.

### ‘Weaponization’ at Al Atheer

The documents seized in Baghdad established the link between the weapons program and Al Atheer, and the Iraqis once again admitted under pressure what they really had been doing. Subsequent inspections confirmed in more depth that they were developing an implosion bomb. Judging from other details such as their effort to produce lithium-6, a tritium precursor, they probably also were hoping to develop boosted fission devices, and they may even have contemplated development of thermonuclear weapons.

In the words of the official report on the seventh IAEA inspection visit to Iraq, which took place in October 1991, “The Al Atheer site has been identified by the team as the prime development and testing site.”<sup>5</sup> Expanding on that statement, the report said: “The existence of an Iraqi weaponization program has been acknowledged by the





**UN inspectors** Kay (on truck carrying satellite uplink) and Davis look up at a water tower at Al Fallujah, where a UN observer in turn was watching an Iraqi convoy of trucks (above) leaving from rear of compound. The trucks carried pole pieces for electromagnetic isotope separation devices. **Figure 4**

Iraqi authorities and confirmed; an organization chart has been obtained. Basic computations and high-explosive testing for component development had been carried out, but—if one takes the details provided by the Iraqi authorities at face value—a practical system for an implosion-type weapon had not yet been achieved.”

As the report went on to say, the Iraqis had obtained essential instruments, such as high-speed streak cameras, and had done sophisticated work in metallurgy, chemistry and detonation engineering. Indigenous capabilities in electronics, on the other hand, did not seem to be on the same level: Apparently the Iraqis were having trouble developing adequate capacitors and bridge wire detonators. Even so, the Iraqis had been able to obtain a disturbing amount of specialized equipment from foreign suppliers without setting off alarms or triggering export restraints: for example, isostatic presses (suitable for shaping explosive charges), vacuum furnaces, machine tools, a plasma spray system, a coordinate measurement machine, and viewing windows for explosive testing bunkers.<sup>5,6</sup>

Through the autumn and winter of 1991–92, nuclear inspection teams continued to visit Iraq to complete component and materials inventories, prepare for the removal of both irradiated and unirradiated reactor fuel from Tuwaitha, destroy EMIS and centrifuge components collected at Tuwaitha, and search for hidden centrifuge and reactor facilities. After a standoff over destruction of missile production facilities that resulted in the Iraqi deputy prime minister's being summoned to the UN Security Council, the Iraqi government conceded that buildings and equipment for production of prohibited items should be eliminated.

Destruction of the Al Atheer site began in April 1992, after yet another diplomatic confrontation with the Iraqis. Following the customary procedures, Iraqi military personnel were required to do the actual destructive work under the supervision of UN personnel. By the end of June the Al Atheer production buildings had been destroyed with high explosives and the bunker for hydrodynamic testing had been filled with concrete and scrap iron.

## Outlook

Those steps completed the destruction of major components of Iraq's nuclear weapons program. The program



represents the first known effort by a party to the NPT to use the treaty as a cover for an all-out effort to develop nuclear weapons, and as such, it raises a host of questions that go far beyond the scope of this article.

Much pertaining to Iraq's future and, in particular, its future place in the world's nonproliferation regime is unclear. But one thing is clear: The Iraqis have not accepted the principle that UN inspections will continue indefinitely. They regard this observation of their activities as an unacceptable intrusion into the sovereignty of their state. Their position is that inspections must stop when the Security Council is satisfied that Iraq has complied with resolution 687.

Security Council resolutions subsequent to 687 have banned Iraqi access to all nuclear technologies except radioisotopes for industry, medicine, and agriculture. But the Iraqis retain the information needed to restart their nuclear weapons program; it is probable that they will restart it if left alone.

## References

1. D. A. Kay, testimony to US Senate Foreign Relations Committee, 16 October 1991.
2. R. Rhodes, *The Making of the Atomic Bomb*, Simon & Schuster, New York (1988).
3. UN Security Council, "Report on the Eighth IAEA On-Site Inspection in Iraq under Security Council Resolution 687 (1991)," S/23283, 12 December 1991.
4. UN Security Council, "Report on the Ninth IAEA On-Site Inspection in Iraq under Security Council Resolution 687 (1991)," S/23505, 11–14 January 1992.
5. UN Security Council, "Report on the Seventh IAEA On-Site Inspection in Iraq under Security Council Resolution 687 (1991)," S/23215, 14 November 1991.
6. UN Security Council, "Report on the Eleventh IAEA On-Site Inspection in Iraq under Security Council Resolution 687 (1991)," S/23947, 22 May 1991. ■